A VISION AND IMPLEMENTATION PLAN FOR
TECHNOLOGY INTEGRATION

by
Maureen McDonald

An education leadership portfolio submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Education in Educational Leadership

Spring 2019

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by

Maureen McDonald

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ACKNOWLEDGMENTS

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ABSTRACT

The use of technology has become an integral part of daily life. In addition to personal use, many employers use technology in the workplace to communicate, increase productivity, and work collaboratively (Purcell & Rainie, 2014; Ertmer & Ottenbreit-Leftwich, 2010). This trend is important for teachers to note. As the need for skilled users of technology in the workplace rises, it is increasingly important for teachers to prepare students to use technology to collect and critically analyze information, communicate their ideas, and collaborate with others (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010).

The Center Elementary School (CES) administration, with support from the district and Parent Teacher Association (PTA), has supplied teachers with various technologies such as laptops, SMARTboards, and iPads. As of the 2018-2019 school year, access to devices was not an obstacle; however, the vision for expected teacher and student technology use remained unclear. At CES, teacher and student usage of technology is inconsistent across grade levels and classrooms. As such, the goal of this Executive Leadership Portfolio (ELP) was to examine teacher, administrator, and PTA board member views on technology integration at CES for the purpose of developing a long-term vision for technology integration. Given the time it takes to design a
relevant, solid long-term vision, this ELP focuses specifically on improvement strategies that could set CES on the path towards this goal.

There are a number of artifacts in this work that reflect different aspects of technology integration at CES. I used a modified version of the School Technology Needs Assessment (STNA) (SERVE Center, 2007) to assess teacher opinions and understanding of their environment, professional development, and the impact of technology on teachers and students. Additionally, the survey gathered data on the frequency of teacher and student participation in various technology-related activities. The results indicated teachers wanted more professional learning related to technology integration. Administration echoed that need, sharing their interest to have more technology-experienced teachers provide professional learning for their colleagues in formal and informal settings. I created an infographic to present data from the teacher surveys, administrator interviews, and parent focus group. The infographic also illustrated the top four professional learning interests according to the STNA results.

To help address the gap in professional learning, I designed four online course modules using the district’s learning management system, Schoology. These modules, framed by research-based practices, shared with users a planning structure for integrating technology in a meaningful way. The modules followed a design-based approach in which teachers not only learn about technology, but how it can be used in specific contexts (Lawless & Pellegrino, 2007).

Creating a long-term vision for technology integration for CES is an administrative decision involving many stakeholders and lies beyond the scope of this
ELP. Instead, the artifacts shared in this document are pieces of the puzzle in moving towards this critical goal. I recommend they be examined closely by all stakeholders so issues related to technology integration at CES can be studied.
Chapter 1
INTRODUCTION

As a teacher at Center Elementary School (CES) for 11 years, I have observed increases in access to technology devices across grade levels. The school and district budgets, along with a technology line item from the Parent Teacher Association (PTA) budget, have financially supported the purchase of SMART Boards, laptops, and iPads. Yet, during informal conversations with administrators and teachers, I realized the school lacked a clear vision for technology integration. This became more obvious to me as I investigated Study Island, a subscription-based online test preparation program purchased by the PTA beginning in 2012.

In 2016, as I began my ELP, the PTA asked teachers if they would like to renew the subscription to Study Island. The principal at the time shared that the PTA noticed there was inconsistent use of the program across classrooms. Since the program was expensive for the PTA to fund, members were interested in gathering teachers’ opinions about renewal. The results of this informal survey informed the PTA that only two out of five grade levels wanted to continue the subscription to Study Island. At this time, the PTA chose to continue the Study Island subscription for fourth and fifth grade. When they discovered it was a minor difference in cost to add first through third grades, they continued all grade level subscriptions until December of 2018. There was no change in a plan for implementation or expectation
of usage. At my grade level, no classrooms continued to use Study Island after this renewal. Since the PTA technology budget primarily consisted of this Study Island subscription, and there was already inconsistent use of the program, I was interested in learning more about how the program’s content aligned to instruction. I conducted a content analysis of the first grade ELA portion and found several misalignments. Several standards were only partially addressed, and others were left out completely. These findings led me to wonder more about the role of technology at CES, specifically how technology programs were selected for instruction and how technology overall was integrated into instruction across the grade levels.

As someone who is passionate about technology integration, I often utilize digital resources and talk with my colleagues about technology in the classroom. During past informal conversations, I noticed a vast difference in how teachers were using technology with their students. Additionally, I observed a change in the school’s mission and vision statement where it once referenced technology integration, but no longer did once the statement was revised in 2017. I also noticed that teachers at CES had limited technology-based professional development despite the increase in devices for students. These three insights, (1) inconsistent use of technology with students, (2) unclear vision for technology integration at the school level, and (3) limited professional development opportunities in technology integration, illustrated an important problem. Though access and funding were present at CES, the vision for technology integration was unclear.
Artifacts

To address this problem, I completed several activities with the intention of meeting various stakeholders’ needs. I surveyed teachers to gather information about their current technology use, views on technology, and professional development needs. I interviewed administrators to understand how they perceived technology use and to gain perspective of what, if any, expectations they had for technology and instruction at CES. I facilitated a focus group with members of the PTA board to gain a parent perspective on technology at CES and understand the way the PTA makes decisions about technology funding. Using the information from the survey, interview, and focus group, I designed an infographic to summarize the current state of technology integration at CES and reflect the goals of parents, administrators, and teachers. I conducted a review of literature on best practices for technology integration and preparing teachers to use technology in teaching and learning. Using what I learned from the literature review, I designed an online professional development program. The modules in the program modeled how to design a lesson that incorporates technology. Additionally, I taught teachers how to choose digital tools and critically evaluate iPad apps by considering elements that could contribute to instruction or put constraints on learning. My long-term goal for CES would be to create a clear vision for technology integration. This would require gathering information from various stakeholders, and ultimately decisions by the administration. Therefore, for the purposes of my ELP, I focused on conducting a variety of activities that would help move CES towards this long-term goal.
Using the technological pedagogical and content knowledge framework.

My review of the literature primarily focused on the Technological Pedagogical and Content Knowledge (TPACK) Framework (Mishra & Koehler, 2006). This is a research-based framework addressing the three domains of teacher knowledge: technological knowledge, pedagogical knowledge, and content knowledge. As illustrated in Figure 1, the framework addresses the individual domains as well as how the areas interact within instructional design.

![Figure 1. Technological Pedagogical Content Knowledge Framework.](www.tpack.org)

Technological pedagogical content knowledge requires teachers to draw upon all three domains of knowledge simultaneously and have the ability to flex between
them in making decisions that support student learning (Niess, 2011). Developing this knowledge often takes instruction, practice, and reflection.

**Professional learning.** I developed five online professional learning modules to help build teachers’ technological pedagogical content knowledge. There are several approaches to developing TPACK. I chose to develop TPACK by building upon teachers’ pedagogical content knowledge (Harris & Hofer, 2009). In this approach, teachers begin their instructional design with their knowledge of content and pedagogy. As they add in technology, they assess how the technology influences their instructional and pedagogical decisions to support or hinder student learning. This strategy for building TPACK is helpful for experienced teachers, as they already have years of instructional strategies to pull from and build upon (Koehler, Mishra, Kereluik, Shin, & Graham, 2014). Teachers are able to keep their instruction focused on the learning and not the digital tool.

Specifically, I framed my professional learning modules around the Technology Integration Planning Cycle (Hutchison & Woodward, 2013) to give teachers a clear process for planning instruction that integrated digital tools. Each module was designed to follow the four knowledge processes (Cope & Kalantzis, 2016). Within various activities teachers experience, conceptualize, analyze, and apply content. Table 1 lists each knowledge process and an example from my Schoology modules. These processes are not linear. Throughout the module activities, teachers flexibly move between these learning activities as they conceptualize new information,
reflect on prior knowledge, analyze content, and apply what they have learned to their classroom context.

Table 1

<table>
<thead>
<tr>
<th>Knowledge Process</th>
<th>Schoology activity</th>
</tr>
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<tbody>
<tr>
<td>Experiencing</td>
<td>Reflect on prior knowledge about what makes apps beneficial. Then, watch screencast on an app evaluation tool.</td>
</tr>
<tr>
<td>Conceptualizing</td>
<td>Compare personal lesson planning process with the Technology Integration Planning Cycle.</td>
</tr>
<tr>
<td>Analyzing</td>
<td>Analyze math manipulatives using the Task Analysis Framework and app evaluation tool.</td>
</tr>
<tr>
<td>Applying</td>
<td>Create a SMART Notebook lesson, using SMART Lab activities, as a tool to support a learning objective you plan to teach.</td>
</tr>
</tbody>
</table>

**ELP organization**

This portfolio is organized into six chapters, which outline specifics about the problem addressed, improvement strategies, and my reflections. The appendices include my artifacts: a content analysis of Study Island, literature review, infographic, teacher survey results, information about the professional learning modules, and a proposal for the PTA’s support of technology-based resources. A description of each artifact is below.

1. **Content Analysis:** This artifact is a content analysis of the first-grade English Language Arts activities on the website Study Island
(www.studyisland.com). The content analysis allowed me to examine the alignment between first grade learning goals and the activities available on Study Island. My findings led me to further explore the role of technology at CES. (Appendix A)

2. Literature Review: In order to deepen my knowledge of technology integration, I conducted a literature review on the importance of technology in elementary school instruction, evidence-based practices for lesson design integrating technology, and professional development. The literature review provides an overview of the TPACK framework, including each domain of teacher knowledge and the ways in which the domains intersect with each other. I reviewed approaches to how TPACK can be measured and developed. (Appendix B)

3. Teacher Surveys: This document reports and analyzes the results of the School Technology Needs Assessment (STNA). The STNA is available through the William and Ida Friday Institute for Educational Innovation at North Carolina State University. The information I gathered by administering this survey provided insight on the current state of technology use at CES. Coupled with the research on technology integration from the literature review, these data helped to
guide the professional learning modules on the topic of technology integration and lesson design. (Appendix C)

4. Online Professional Learning: Professional learning is a critical step when building a long-term vision for technology integration at CES. To this end, I created an online professional learning program which consisted of four instructional modules and one for reflection. Each instructional module is an individual artifact; however, they were framed by the same rationale. The modules were written to help teachers build upon their pedagogical content knowledge as they expanded their technological pedagogical content knowledge. Each of the instructional modules follow the Technology Integration Planning Cycle (Hutchison & Woodward, 2013) asking teachers to choose and evaluate a digital tool that supports their instructional goal and approach. Within each module there are learning activities designed for teachers to use different knowledge processes (Cope & Kalantzis, 2016) to experience, conceptualize, analyze, and apply what they learn. (Appendix D)

a. Module 1: The National Education Technology Plan (U.S. Department of Education, Office of Educational Technology, 2016) argues that “effective use of technology is not an optional
add-on or a skill that we simply can expect teachers to pick up once they get into the classroom” (p. 35). While this quote is aimed at teacher education programs, the same holds true for in-service teachers. Teachers require more than just an opportunity to try out technology in the classroom and pick up the skill on their own. Teachers would benefit from an understanding of how lesson design is affected by technology integration in addition to some functional knowledge on how to use iPad applications with their students. In this first module, I shared the planning cycle model created by Hutchison & Woodward (2013). This planning cycle puts the choice of digital tool as one of the final steps, which helps keep the focus on learning and may be more comfortable for hesitant teachers.

b. Module 2: The majority of the professional learning was designed to help guide teachers through the planning cycle in a specific content area and grade level. Focusing within content is an important factor in adding value to professional development (Ertmer & Ottenbreit-Leftwich, 2010). In this module, I modeled how to use the planning cycle (Hutchison & Woodward, 2013) in writing instruction. Secondly, I provided
a menu of iPad applications that align well to writing
instruction. An important part of the planning cycle is choosing
the digital tool that best matches your learning goal. This part
can be difficult for teachers who have not experimented with
the iPads before. I developed an evaluation tool for teachers to
use as they analyze iPad apps. I modeled how to use that
evaluation tool to decide whether or not their digital choice is
appropriate. Finally, one element of the module is the ability
for teachers to interact with each other and share their lesson
ideas and experiences. Hearing and seeing other’s success can
help bring about change in pedagogical belief (Ertmer &
Ottenbreit-Leftwich, 2010).

c. Module 3: In this module, I modeled how to use the planning
cycle (Hutchison & Woodward, 2013) in math instruction. I
specifically focused on the use of virtual manipulatives. The
creator of our math curriculum, Math Learning Center, has
developed nine virtual manipulatives appropriate for various
instructional purposes. I modeled how to utilize the evaluation
tool from Module 2, and the Task Analysis Framework (Reiten,
2018) to identify the constraints and contributions in utilizing a
virtual manipulative to support an instructional goal. Similarly to Module 2, an element of the module is the ability for teachers to interact with each other and share their lesson ideas and experiences.

d. Module 4: In this module, I modeled how to use integrate technology into fifth grade science instruction. I specifically focused on using SMART Lab activities to increase engagement when using the SMART Board. These activities allow for students to actively participate instead of only using the SMART Board only to view content. I provided a menu of SMART Lab activities and modeled how students connect to those activities using iPads. At the end of the module, I asked teachers to share their SMART Notebook files in order to foster collaboration and reflection.

e. Module 5: This module concludes the course with a final reflection opportunity and three discussion boards to foster a culture of collaboration beyond the activities in the modules. The discussion boards allow teachers to post about digital tools, SMART Lab activities, and reflections on instruction.
5. **PTA Focus Group and Recommendations:** I conducted a Focus Group with three members of the PTA board to gather information on how decisions are made regarding technology. I wrote a decision-making plan to help guide future PTA members towards purchasing technology-related items and using technology to support family engagement. (Appendix E)

6. **Infographic:** In an effort to share what was learned through teacher surveys, interviews with administrators, and the PTA Board, I created an infographic of this information. The infographic includes current devices at CES, teacher views and professional learning needs from the STNA, and the beliefs of school administrators and parents obtained from interviews. Alongside the infographic is a written document with detailed explanations of data represented in the image. The infographic provides teachers, administrators, and the PTA with important highlights in an easily digestible format. (Appendix F)

This Education Leadership Portfolio is designed to share what I have learned about technology integration and leadership through a review of the literature, data collection and analysis, and professional reflection. The first chapter introduces my project and describes each of the artifacts I have included in the portfolio. Chapter two outlines the problem I chose to address and why it was important to consider at
my school. In Chapter three, I discuss how I addressed this problem and describe my improvement strategies. Chapter four analyzes both the strengths and limitations of the professional development modules I designed. In chapter five, I address how changes in administration, funding, and priorities have impacted technology integration at CES. Within that chapter, I describe how my improvement strategies help to overcome some of these barriers and what barriers may remain despite my efforts. Finally, the last chapter is a reflection of how I have changed as a leader, scholar, problem solver, and partner throughout my coursework in the Ed.D. program.
Chapter 2
PROBLEM ADDRESSED

Problem Statement

Center Elementary School currently has several computer labs, laptop and iPad carts, and a 1:1 iPad program in fourth and fifth grade. The school also has a PTA, which has financially supported technology initiatives. Though access and funding are present at CES, the vision for technology integration remains unclear. This lack of vision is an important factor in technology integration at CES. Teachers’ technology use often depends on the culture in which they work. They are more likely to readily adopt new practices if they are part of the established culture (Somekh, 2008; Ertmer & Ottenbreit-Leftwich, 2010). School culture, a key variable, includes having a defined understanding of effective instructional practices. In order to create a culture that promotes technology integration, that definition must recognize technology as an important part of teaching and learning (Ertmer & Ottenbreit-Leftwich, 2010). The National Education Technology Plan (NETP) (U.S. Department of Education, Office of Educational Technology, 2016) also promotes the importance of vision, encouraging education leaders to facilitate the development of a shared vision on how technology can support learning and open doors in transforming education.

The NETP (U.S. Department of Education, Office of Educational Technology, 2016) asks educational leaders to ensure ongoing professional learning aligned to
student learning. Many of the mandatory technology-based professional development sessions at CES over the years have been about a specific tool, not how or why to integrate technology. A lack of professional learning on how to integrate technology can act as a barrier, hindering teachers’ ability to move forward using technology in their instruction (Hutchison & Reinking, 2011). A clear vision, with a plan to support teacher learning, could help resolve the current disconnect between the availability of technology and the varying degrees of technology use among teachers.

I began investigating this topic in 2016. At that time, the school was under different leadership. During her tenure, the previous principal facilitated the purchase of SMART Boards, laptops, and iPads. The number of digital devices grew each year. Yet, there was no explicit guide to implementation or a shift in instructional practices.

Center Elementary School began the 2017-18 school year with a new principal. This shift in leadership was an excellent opportunity to critically evaluate why and how teachers should be integrating technology into their instruction and work with the administration to develop a clear vision for technology use in the school.

**Demographic Composition**

Center Elementary School (CES) is a suburban elementary school located in Delaware. The school is one of seven elementary schools in the district, serving first through fifth grade students. The school was recognized in 2017 as a National Blue Ribbon School by the U.S. Department of Education.

**Student characteristics.** In the 2017-2018 school year, Center Elementary School (CES) served 622 students. Of these students, 9.8% were identified as
requiring special education services. The overall school population in 2017-2018 was comprised of 15% African American students, 16.4% Asian students, 6.4% Hispanic students, 58.4% White students, and 3.9% of students who are Multi-Racial. Also, 6.1% of students received ESL services as English Language Learners and 8.8% of students were identified as coming from low income homes (Delaware Department of Education, 2018).

**Teacher characteristics.** In 2017-2018, CES employed 26 classroom teachers, 6 special education teachers, 7 specialists (e.g., music, art, Spanish), a reading specialist, and 7 para-professionals. The majority of staff members (90.5%) are white and 9.5% are Hispanic. The staff includes many teachers with continuing degrees, with 83.3% of the staff holding a Masters degree or above. The teaching experience of staff members varies, with slightly more than half (52%) of teachers having between 10 and 20 years of experience (Delaware Department of Education, 2018).

**Additional School Characteristics**

**Performance data.** Overall, students at CES consistently perform well on yearly Smarter Balanced Assessments. In 2017-18, the school had the top scores for elementary schools in the district in both Language Arts and Math at all grade levels (DSARA-Public, 2018). Table 2 and Table 3 show achievement data for the 2018 Smarter Balanced assessment, comparing the percentages of students proficient at CES to the district and state levels.
Table 2

Percent of Students Proficient on 2018 Smarter Balanced ELA Assessment

<table>
<thead>
<tr>
<th>Grade</th>
<th>CES (%)</th>
<th>District (%)</th>
<th>State (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>87</td>
<td>67</td>
<td>52</td>
</tr>
<tr>
<td>Grade 4</td>
<td>94</td>
<td>72</td>
<td>55</td>
</tr>
<tr>
<td>Grade 5</td>
<td>86</td>
<td>73</td>
<td>58</td>
</tr>
</tbody>
</table>

Note: Data for student proficiency on Smarter Balanced ELA Assessment from Delaware Department of Education. (DSARA-Public, 2018).

Table 3

Percent of Students Proficient on 2018 Smarter Balanced Math Assessment

<table>
<thead>
<tr>
<th>Grade</th>
<th>CES (%)</th>
<th>District (%)</th>
<th>State (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 3</td>
<td>79</td>
<td>62</td>
<td>54</td>
</tr>
<tr>
<td>Grade 4</td>
<td>&gt;95</td>
<td>67</td>
<td>50</td>
</tr>
<tr>
<td>Grade 5</td>
<td>67</td>
<td>55</td>
<td>43</td>
</tr>
</tbody>
</table>

Note: Data for student proficiency on Smarter Balanced Math Assessment from Delaware Department of Education. (DSARA-Public, 2018). State website states data is suppressed when a cell contains a percentage higher than 95.

Students in first and second grade do not take the Smarter Balanced Assessment. Instead, these students take the Measures of Academic Progress (MAP) assessment three times a year. The purpose of this assessment is to measure academic
growth in reading and math, as opposed to proficiency. This assessment, like Smarter Balanced, is taken on the computer. MAP scores are not reported to the state and therefore the data on student performance is not publicly available.

**Technology access.** The school has several locations where teachers and students can access technology. Each classroom has at least two student PC desktop or laptops and a teacher computer. Additionally, the building has five desktop computer labs. One is used for computer classes as a weekly special. Two of the labs have 32 PC desktop computers. The remaining two labs have 12 PC desktop computers. There are four sets of laptops. Two carts have 14 laptops, and one has 15 laptops. The last set of 30 laptops has been divided among classrooms. In addition to one-to-one iPads in fourth, fifth, and one third grade class - there are three sets of shared iPads with 25 iPads each. Computer labs and iPad carts are often used for testing throughout the year. When not used for testing, teachers can sign up to use the labs, iPads, or laptops during instructional time.

The assigned grade, estimated cost, and funding sources for the shared laptops and iPads is detailed in Table 4. Technology access at CES is made possible through district and building funds, as well as contributions from the PTA.

The CES PTA is involved in supporting teacher mini-grants, social gatherings for students and families, and funding a variety of educational initiatives identified by the school. For the purpose of my ELP, I was particularly interested in the line item they had dedicated to supporting technology at CES. At the end of the 2016-2017 school year, the PTA partially funded a new iPad cart with 25 iPads. The funding for
this initiative was split between the PTA and general building budget funds set aside by the schools’ previous principal. The PTA’s annual Walk-a-Thon fundraiser also directly funded any technology-based initiatives. In the past, this included SMARTboards, iPads, laptops, and access to subscription-based programs such as IXL.com and Study Island. IXL and Study Island are both online programs where students can practice math, language arts, science, and social studies skills. In 2016-2017, the PTA technology funds supported a two-year Study Island subscription for all grade levels and partially funded the purchase of 25 iPads. During my focus group with the PTA board, they shared it was unlikely they would continue the technology line-item. With a change in administration at CES and a change in the PTA board, they wanted to shift the focus to family engagement events. They stated they would continue to financially support technology needs of the school if asked by administration to do so; however, the district has started to fund most of the devices coming to the elementary school.

Another technology addition to CES was the implementation of a 1-1 iPad initiative in fifth grade (2017-2018) and fourth grade (2018-2019). The funding for this initiative came indirectly from the district referendum passed in December of 2016. According to the referendum, 6th graders in the current middle school 1-1 program will receive brand new iPads each year. They will use these iPads for three years and then after 8th grade, the iPads will be passed down to the elementary schools. As a result, CES will continue to receive the secondhand iPads each year, with an eventual goal to have 1-1 iPads in third, fourth, and fifth grade.
School vision. In April of 2017, the school website read that part of the school’s vision was “all staff members will be provided with in-service training to successfully implement technology into all curricular areas” (Center Elementary School, 2017). Later that year, the statement was revised to a more overarching vision that “collaboration, communication, critical thinking and creativity will empower students to impact the global society” (Center Elementary School, 2017). This vision statement was written collaboratively with administration and teachers. This vision implies a focus on the 21st Century learning skills as outlined by the Partnership for 21st Century Learning (2015). The Partnership for 21st Century Learning also highlights how the use of technology is important in teaching each of these skills.

Table 4

<table>
<thead>
<tr>
<th>Device</th>
<th>Grade level</th>
<th>Estimated cost</th>
<th>Funding source</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 iPads</td>
<td>1st</td>
<td>$10,560</td>
<td>Building</td>
</tr>
<tr>
<td>20 iPads</td>
<td>2nd</td>
<td>$10,260</td>
<td>Building</td>
</tr>
<tr>
<td>25 iPads</td>
<td>3rd</td>
<td>$10,825</td>
<td>Building/PTA</td>
</tr>
<tr>
<td>10 iPads</td>
<td>1st &amp; 2nd</td>
<td>$4,330</td>
<td>Building</td>
</tr>
<tr>
<td>30 Laptops</td>
<td>Shared</td>
<td>$15,690</td>
<td>District</td>
</tr>
<tr>
<td>28 Laptops</td>
<td>Shared</td>
<td>$14,644</td>
<td>PTA</td>
</tr>
<tr>
<td>30 Laptops</td>
<td>Divided</td>
<td>$15,690</td>
<td>PTA</td>
</tr>
</tbody>
</table>

*Note:* Estimated costs for iPads include cases and AppleCare.
Examples from the P21 Framework (Partnership for 21st Century Learning, 2015) include critically evaluating information they find on the internet, creating digital media, and using technology to effectively communicate information. In this way, while a specific plan for integrating technology is no longer present on the school website, it is implied by the reference to these 21st century skills. Therefore, my leadership initiative to help develop a vision for technology integration at CES functions within the current school vision. Integrating technology can further support the skills students need to collaborate, communicate, create, and think critically in the 21st century.

In the spring of 2018, the website was re-designed to aesthetically match other school websites in the district. As a teacher, we were told to save anything we needed as everything would be deleted when the site launched. During a review of the website in the fall of 2018, I observed that no reference to a school mission or vision is found on the current version of the site. During my interviews with administration, prior to the website overhaul, I asked about the vision statement and whether or not it may be revised to include technology. The assistant principal shared that it was unlikely another vision would be written at this time because the current one was fairly new. This implies that our school is still operating under that revised vision. When I review the website for the School Success Plan, it also contains an outdated version from 2016 (Center Elementary School, 2018). It appears that the removal of the school mission and vision may have been an oversight.
**School success plan.** The School Success Plan is a district document that each school must complete. It outlines school activities that support strategic objectives, as well as funding and support staff for these activities. Each school’s Success Plan is combined to create the district Consolidated Grant. This Consolidated Grant is then sent to the Delaware Department of Education for review and funding is granted based on needs outlined in the grant. The plan is revised each year by our school leadership team. Not every element of the School Success Plan is approved or achieved each year, partially due to financial resources.

The 2016-2017 School Success Plan included the opportunity to provide professional learning surrounding the topic of iPads. The plan detailed funds to be used to purchase iPads for teacher leaders who would, in turn, train other members of the staff. At the time, all classrooms were encouraged to host classroom blogs, and this was also referenced in the School Success Plan. The 2017-2018 School Success Plan eliminated the professional learning section. That plan only reflected the use of technology in its mention of communication with families. In the proposed 2018-19 School Success Plan, classroom communication through technology is not mentioned, perhaps due to the fact that the tools used (Seesaw, Schoology, e-mail) are not an expense. In this year’s version of the plan, technology is mentioned with regards to specific content-based digital tools that can support instruction. The differences in the language between the three plans are shown in Table 5.
When I closely examined the changes in the School Success Plan, two elements stood out to me: the highlighted apps and the omission of professional learning. In the 2018 version of the school success plan, three of the apps (Read Naturally, Reading Eggs, and Math Seeds) are only used for intervention. The general student population at CES will not benefit from this use of technology. These are skill-review apps that are accessed at the students’ own instructional level. Choosing to focus on them implies a belief that technology use is independent from classroom

<table>
<thead>
<tr>
<th>Academic year</th>
<th>Reference to technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 – 2017</td>
<td>Buy 15 teacher iPads and keyboards and research trainings for staff to attend to learn about apps and programs that will enhance and enrich student learning (Apple, Google). Teachers attending trainings will train the staff. Continue class blogs.</td>
</tr>
<tr>
<td>2017 – 2018</td>
<td>Establish technology-based classroom communication with families, i.e. blogs, Seesaw, websites</td>
</tr>
<tr>
<td>2018 – 2019</td>
<td>Web-based technology for supporting instruction, practicing &amp; reinforcing skills &amp; strategies, intervention tools, etc. (a) Read Naturally; (b) Reading Eggs; (c) Math Seeds; (d) Raz Plus; (e) PBL</td>
</tr>
</tbody>
</table>
While these apps can be beneficial for students, there is no focus on apps that students can use to present their learning, collaborate, or communicate with others. Secondly, the omission of professional learning from the School Success Plan sends the message that this is no longer a priority. In 2016, CES proposed that teachers would attend various technology-based trainings and then share that knowledge with the staff. This did not occur. Part of developing a positive culture surrounding technology integration is providing teachers with professional development (Groff & Mouza, 2008). After observing these two topics in the 2018 School Success Plan, it was important for me to gain an understanding of where technology integration falls as a priority for the school and why. Developing a clear vision for technology integration at CES will require support and direction from administration and possibly an avenue for securing funding through the School Success Plan.

**Professional development (PD).** A portion of the school’s professional learning is completed during one-hour after school staff meetings once a month. In addition to these meetings, teachers participate in building-based and district-based professional development several times a year. From 2015-2017, a single focus for this PD was chosen by the administration with input from the staff via an online survey. In 2015-2016, the majority of PD was about math instruction. In 2016-2017, many staff meetings focused on inquiry-based learning. The delivery of this type of professional development varied. To learn more about math discourse, the staff attended presentations from the district math specialist and staff members who are
members of the district math committee. Inquiry-based learning professional
development often followed a structure that included presentations, an opportunity for
planning within grade level teams, followed by sharing ideas with colleagues in an
informal presentation format. A specific professional learning focus has not been
shared for 2018-19, though there has been time allotted during team meetings to learn
about and discuss Responsive Classroom strategies. CES rolled out new curricula in
both math and science this year, and thus far those subjects have been the priority for
professional development days.

To date, there has been minimal staff development time allocated to support
technology integration. Despite access to laptops, computer labs, and iPads, prior to
2017-2018 the staff had only five technology-based presentations or trainings. None
of these trainings were as a result of lead teachers being trained, as per the 2016-2017
School Success Plan. A representative from UDLibSearch, a state-funded
organization supported by the University of Delaware, came to demonstrate how to
use various databases with students. Another training included an overview of
Schoology, the Learning Management System used in the district. The training was
provided by our district technology specialist and showed how to use the basic
features of the system. A third training was a differentiated session on Edublogs, the
host of each classroom blog at CES in 2016-17. This professional learning day was
divided into three sessions for those who had not set up their site, beginners, and
advanced users. The sessions were led by teachers. I helped lead the beginner group
with hands-on practice and supporting teachers as they set up their blog. At the end of
the 2016 - 2017 school year, I was asked to share my experience with using Seesaw digital portfolios. This session was a 45-minute presentation by myself and another teacher. During this presentation, we gave an overview of the technical features of the Seesaw app. The school vision at this time read, “all staff members will be provided with in-service training to successfully implement technology into all curricular areas” (Center Elementary School, 2017). A common theme among all of these presentations is that they focused heavily on the digital tool and left little opportunities for teachers to apply their knowledge, collaborate, or reflect on their practices.

During informal conversations with the previous principal and current assistant principal, they both stressed the importance of using technology as a learning tool to support instruction. While this is a good start to a vision, the plans for how teachers can begin to accomplish that goal are still unclear. Understanding the importance of integrating technology requires learning how technology can change teaching and learning (Koehler & Mishra, 2009). Our assistant principal also mentioned teachers sharing resources. She would like to see teacher-led professional development and teachers using their more skilled colleagues as resources. This outlook is promising for developing a vision for technology integration and opportunities for teacher learning.

With the arrival of a new principal in 2017-18, there have been additional learning opportunities for the staff. At the start of 2017-18, first through third grade moved away from Edublogs and began using Seesaw exclusively. Due to this, we had an additional informal learning opportunity for Seesaw at the start of the 2017-18 school year and again at the start of the 2018-19 school year. Teachers set up their
classes on the website while experienced teachers, such as myself, answered questions. In January of 2018, an Apple Professional Learning Specialist came to each grade level for iPad training. In September of 2018, I joined two other teachers in creating voluntary after school sessions about technology-based resources.

Organizational Role and Responsibilities

I am a first-grade teacher at CES. In the 2018-2019 academic year, I began my eleventh year teaching in the building. I frequently use iPads in my own instruction and am called upon by my colleagues for assistance when attempting to utilize technology in their classroom. During the two teacher-led professional development sessions we have had at our school, I have been asked to lead portions of the presentation. My own classroom uses of the website Edublogs, and later the app Seesaw, helped the school determine ways to use technology to communicate with parents. I was asked to be a leader in helping teachers set up their accounts and explore the affordances of these tools. I currently co-lead technology-based professional learning sessions for teachers every two months.

Often, I hear from other teachers that students of certain ages cannot use technology because it is too complex or distracts from instruction. I bring the pedagogical knowledge of how to manage a classroom of our youngest learners using iPads to engage in a learning experience. When offered, I frequently attend professional development for technology outside of my building, such as recently joining a district cohort of teachers to develop my knowledge of SMART Lab activities.
As a doctoral candidate, I have reviewed literature about the relationship of technological, pedagogical, and content knowledge. I bring an understanding that integrating technology in a meaningful way means looking at the ways that technological knowledge, pedagogical knowledge, and content knowledge work together in enhancing and transforming current learning practices (Harris, Mishra, & Koehler, 2009). Additionally, I have examined how teachers can implement planning cycles that encourage teachers to use technology in a meaningful way and reflecting upon their choices in learning tools. This is important in my goal to help support teachers as they create meaningful learning experiences with technology.

As a result of my work on this topic, I approached our administration to propose some after school professional learning opportunities. Developing this Education Leadership portfolio has helped my professional growth by allowing me the experience of developing my own online professional learning content. I am excited to use what I have learned through my ELP to provide learning opportunities for teachers in my school and help empower them to use technology in their instruction. Additionally, it afforded me opportunities to communicate with multiple stakeholders – teachers, administration, parents – as we work to define technology integration at CES. These new skills will help contribute to my growth as a leader in the area of educational technology.

**Improvement Goal**

The students and staff at CES have access to technology without a clear vision of how that technology can best be used in instruction. This has led to infrequent
professional learning opportunities for staff and varying degrees of technology integration in the school. Developing and carrying out a vision for technology integration will be a coordinated problem-solving effort, involving administration, teachers, parents, and even students.

My long-term improvement goal was to work with the administration and staff to create a clear vision for technology integration at CES. Forming this vision will require a gathering of information from various stakeholders and ultimately decisions made by administration. Therefore, for the purposes of this ELP, I developed activities that will help move CES towards this long-term goal. I used the Technological Pedagogical and Content Knowledge (TPACK) Framework (Mishra & Koehler, 2006) to guide my work in providing administration and teachers an understanding of effective technology integration. I used research-based practices such as the Technology Integration Planning Cycle (Hutchison & Woodward, 2013) to develop professional learning resources to support teachers in growing their technology integration skills. Professional learning was also guided by teacher and administration input through surveys and interviews. Finally, I created a plan to guide the PTA in their support of technology-based resources.
Chapter 3

IMPROVEMENT STRATEGIES

New technology devices have been added to Center Elementary School over the past few years. SMART Boards were brought into each classroom. Laptop carts were purchased for shared use. New computer labs were created from empty classrooms. iPad carts were purchased for shared use followed by a 1:1 program in fourth and fifth grade. While the school has seen an increase in devices, teachers have not been tasked with a specific goal instructional use of technology. Therefore, the quantity and quality of technology integration across classrooms is inconsistent. Yet, the Common Core Standards state that all students should be able to “use technology and digital media strategically and capably” (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). With this in mind, I chose to focus on working towards a clear vision for technology integration at CES.

Developing a vision for technology integration is a long-term goal, and one that would need involvement, approval, and support from various stakeholders. For the purposes of my ELP, I chose to focus on improvement strategies that would set CES on the path towards this goal. I consider each artifact in this portfolio a stepping stone in that direction. I purposely chose improvement strategies that could be targeted for each important stakeholder in the decision-making process: administration, teachers, and parents.
Content Analysis

My improvement strategies began by examining an online test preparation program used at CES, Study Island. Schoolwide subscriptions to this program were purchased in 2012 by our Parent Teacher Association through its technology line item. In 2016, just before I conducted this content analysis, the PTA asked CES teachers if they were interested in continuing the program, as it was a large expense. In fact, it was the largest item in the technology budget. Only fourth and fifth grade teachers wanted to see the program renewed. Yet, the PTA renewed subscriptions for all grade levels until December of 2018. It seemed that by continuing to spend money on Study Island, the PTA was implying it was an important tool for technology integration at CES. Therefore, I was interested in understanding what benefits Study Island had for student learning.

I completed a content analysis of the first grade English Language Arts portion of the program. I focused on mapping the content of Study Island questions in literature, informational text, and foundational literacy skills to the Common Core State Standards. Within each subset of reading skills, I began by listing the standards Study Island claimed were addressed with their activity. Next, I logged on to the activity and participated in answering ten questions as a student. During this time, I noted the types of questions and how closely they aligned to the Common Core State Standards. Third, I looked for any standards that Study Island claimed were addressed; but, were not presented during my review. Finally, I reviewed each activity’s teacher page and noted any additional teacher resources. Through this
process, I observed that much of the content was not aligned to the standards. Some standards were incompletely covered while others were omitted entirely. Also, what stood out to me was that even though funding came from a technology budget, the purchase of Study Island was more about test preparation than integrating technology into instruction. This artifact was the catalyst that led me to look at the bigger picture and further investigate the role of technology at CES.

**Preparing Online Professional Learning**

My largest undertaking was creating an online professional learning program which consisted of four instructional modules and one module focused on reflection and future collaboration. This artifact was purposely completed following the literature review, teacher survey, and administrator interview so that what was learned from those artifacts could contribute to my instructional design. In the section below, I describe the rationale for each artifact, what information was collected, and how that impacted the professional learning modules.

**Literature review.** My first action was to complete a review of research about the topic of technology integration in classroom instruction. To locate relevant publications, I conducted systematic searches with terms such as “technology integration” AND “elementary school” OR “digital tools” AND “instruction” OR “professional development” AND “technology integration” using the Education Full Text database at the UD library. These searches uncovered a body of research on Technological Pedagogical Content Knowledge (TPACK) (Mishra & Koehler, 2006), including how TPACK was measured and developed in teachers (e.g., Shinas,
Karchmer-Klein, Mouza, Yilmaz-Ozden, & Glutting, 2015). The search also led me to research on a variety of instructional frameworks to help guide teachers’ instructional design (e.g., Harris & Hofer, 2009; Watulak & Kinzer, 2013). One framework in particular, the Technology Integration Planning Cycle (Hutchison & Woodward, 2013), was especially relevant to my work. It was framed by TPACK and encouraged teachers to use learning goals to drive instruction. Furthermore, it provided steps for determining if technology integration was the most effective approach to engaging students’ in the content.

In order to adopt this framework as part of the CES vision for technology integration, professional development would need to be provided. My search for research on technology-related professional development identified three main organizational structures for professional learning (Lawless & Pellegrino, 2007): one-shot workshops, design-based approaches, and coaching models. One-shot workshops are short professional development offerings, typically lasting one hour to one day. When used for technology training, they typically cover the basics of how to operate a specific digital tool. There is little time allocated for application to practice and there is no follow-up, so teachers often feel a disconnect between what they learned and the context of their classroom. Design-based approaches allow teachers to learn new content related to the needs of their classroom. With technology, design-based approaches allow teachers to learn about digital tools within their own content areas. Time is allocated for teachers to develop ways to apply what they have learned to classroom practice. Design-based approaches also place an emphasis on reflection
and collaboration with colleagues. Finally, coaching models provide the ability to have individual support with new learning. Teachers explore digital tools within the context of their curricular needs. They participate in the personal support of a coach or mentor who can provide ongoing professional learning, tailored to the learner.

Immersing myself in the literature related to professional development models helped me conceptualize the current professional development occurring at CES. The few learning opportunities provided for teachers had all been one-shot workshops with the goal of presenting content to teachers. They focused primarily on technology skills, creating a disconnect between the content presented and the ability to apply it to classroom practice (Lawless & Pellegrino, 2007).

**Impact on professional learning modules.** My literature review heavily influenced the professional learning modules. TPACK (Mishra & Koehler, 2006) grounded my understanding of technology integration and the Technology Integration Planning Cycle (Hutchison & Woodward, 2013) framed the professional development. I designed each module to model the cycle while giving teachers opportunities to apply it to their own instructional planning. I also chose to create my professional learning using the design-based approach described in my literature review (Lawless & Pellegrino, 2007). Each of my modules allowed teachers to learn about technology situated in the context of specific subject areas and their own classrooms. Teachers did not simply learn about digital tools. Instead, they identified learning goals and then evaluated tools based on their ability to support grade level instructional goals.
Administrators’ perspectives. I interviewed both the assistant principal and principal of CES to gather information about their views on technology integration, expectations of teacher and student use, and any benefits or challenges they foresee in integrating technology into instruction. Through those interviews, I learned that administrators view technology as a means for increasing engagement, efficiency, and collaboration. They also saw teacher leadership as key to all professional development initiatives and appreciated teachers sharing what they know with each other.

Impact on professional learning modules. I used the data from the administration interview to guide a few elements of my professional learning modules. Though CES may not have a specific vision for technology, the interviews indicated that it is important teachers use technology to increase engagement and collaboration. Keeping this in mind, I chose to model tools such as Padlet, FlipGrid, and Google Slides which have the potential to support engagement and collaboration with students. During the interviews, both administrators also discussed the importance of teachers sharing ideas about technology integration with one another. I included this element as well and provided opportunities for collaboration along the way. I also developed three discussion boards for continually sharing lesson ideas and reflecting on teaching practices after teachers completed all four instructional modules.

Teachers’ perspectives. Part of planning effective professional learning is reflecting the needs and concerns of the school and individual teachers (Hunzicker, 2011). To collect data about the current state of technology integration and teachers’
needs, I surveyed CES teachers using a modified version of the School Technology Needs Assessment developed by the William and Ida Friday Institute for Educational Innovation at North Carolina State University’s College of Education (SERVE Center, 2007). The survey asked teachers about technology with regards to infrastructure, budgeting, professional development, usage, and impact.

**Impact on professional learning modules.** The survey data indicated teachers were open to opportunities for learning on nearly every topic involving technology. Specifically, 92% of respondents agreed they would benefit from professional learning about the identification, location, and evaluation of technology resources. These results informed my professional learning modules in two ways. First, it confirmed my colleagues’ interest in learning more about technology integration. Second, it directed me to create opportunities for them to identify and evaluate digital tools for their grade-level appropriateness and ability to support student learning.

**Professional Online Learning Modules**

Findings from the artifacts described above directly informed the design of professional online learning modules. I chose to focus on iPad apps throughout the modules due to the growing number of iPads at CES. The online modules were created within Schoology, a learning management system utilized by our district and familiar to CES teachers.

**The need for professional learning.** Data from the teacher survey indicated that CES teachers are open to various professional development topics surrounding
technology. Each question prompt had no less than 8 out of 13 teachers agree the topic would be beneficial to them as educators. One item stood out as I developed my professional learning plan. Out of the 13 respondents, 12 agreed that they would benefit from professional development on the identification, location, and evaluation of digital resources. I used this information to create online modules that not only presented digital tools to teachers; but, demonstrated how to evaluate digital choices according to their instructional goals. Teachers need more than just technical knowledge of these tools. They need knowledge of how to expand their pedagogical practices and make instructional decisions with technology to best support learning (Lawless & Pellegrino, 2007; Ertmer & Ottenbreit-Leftwich, 2010).

**Technological pedagogical and content knowledge framework.** The content of the professional learning modules was anchored in the Technological Pedagogical and Content Knowledge (TPACK) Framework (Mishra & Koehler, 2006). This research-based framework addresses three domains of teacher knowledge - technological knowledge, pedagogical knowledge, and content knowledge - and how those domains interact during instructional design. The online modules are designed to help teachers build their TPACK by drawing upon their current pedagogical content knowledge (PCK). This method of increasing teachers’ TPACK is useful for a school like CES, with many experienced teachers, because these teachers already have years of instructional strategies and content knowledge to pull from as they add in knowledge of technology (Koehler, Mishra, Kereluik, Shin & Graham, 2014).
Frame for technology integration. To provide a planning guide for teachers, I introduced teachers to the Technology Integration Planning Cycle developed by Hutchison and Woodward (2013). The Technology Integration Planning cycle is a frame for integrating technology in lesson design. As I completed my literature review, I found the simplicity of this frame made it easy to comprehend and apply. The planning cycle directs teachers to first choose an instructional goal and instructional approach. This helps teachers begin with their PCK before introducing any technological knowledge. As teachers go through the cycle, they choose and evaluate digital tools and reflect upon the ability for the digital tool to support or enhance the instructional goal. One key feature of the cycle is that teachers are encouraged to abandon the digital tool if it is not appropriate for achieving their instructional goal. Using the Technology Integration Planning Cycle encourages teachers to design lessons that are not driven by the technology; but, instead use digital tools to support, extend, and transform learning.

Design. The activities within the online modules reflected the four knowledge processes identified by Cope and Kalantzis (2016). These knowledge processes are a frame for developing activities to teach content. Participants of the modules have multiple opportunities to experience, conceptualize, analyze, and apply content as they progress through all 5 modules. For instance, there are opportunities to explore iPad apps in a range of content areas, assess the apps’ contributions and constraints for student learning using an evaluation tool, and reflect on how apps can support instructional goals in their professional context.
Data from the interviews indicated that administrators would like to see teachers using technology to increase engagement, efficiency, and collaboration. In order to support teachers in these practices, I chose to mirror tools teachers could use in the classroom within the professional learning modules (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012). These included Flipgrid, Google Applications, Padlet, and creating the course within the district’s learning management system, Schoology.

The fourth module specifically focuses on one iPad app, SMART Lab. I highlighted this app because every classroom at CES is equipped with a SMART Board. As the novelty of the SMART Board has worn off over years, it can easily become a teacher-centered tool. The SMART Lab activities allow students to connect with content that teachers create in SMART Notebook. In some activities, student responses can be immediately recorded on the screen in live time. Using SMART Boards in this way can help increase engagement and collaboration, which are two of our current administrators’ visions for technology integration.

The professional learning modules conclude with a fifth module focused on continued opportunities for collaboration and reflection. Collaboration and continuous reflection are important elements of professional learning (Lawless & Pellegrino, 2007). As teachers develop collaborative partnerships, they can further develop their skill set and increase their confidence through observing others’ success (Ertmer & Leftwich, 2010). The support of colleagues can help sustain long-term learning (Mouza, 2009). Additionally, given what I learned about different approaches to
professional development and the history of one-shot sessions at my school, I was interested in creating a learning opportunity that sustained teacher engagement through the online environment.

The fifth module consists of a series of discussion boards designed to promote teamwork between teachers. It begins by encouraging participants to reflect on what they learned in the modules overall and how the content can be applied to their classroom teaching. The remaining three discussion boards are categorized by topic: SMART Lab Activities, Digital Tools, and Reflections on Teaching Practices. These are spaces for teachers to share resources, discuss tools, and support one another’s practices. To scaffold the teachers’ use of the discussion boards, I provided examples of my personal reflections and use of technology in my instruction. In these examples, I emphasize the importance of identifying learning objectives and focusing on student learning rather than building lessons around technology tools. I am unsure if these boards will be utilized. My assumption is they may not be if there is no administrative directive; however, the process of completing this ELP illustrated the importance of designing on-going professional learning. I could not design an online learning experience without providing opportunities for continued follow-up and collaboration.

PTA Focus Group

I conducted a focus group with three of the five members of the PTA Board. During this focus group, I gathered information about PTA funding and parent views on technology integration. Since PTA funds have been used to make technology purchases in the past, I was interested to learn more about their vision for technology
integration at CES. The focus group revealed inconsistent views about technology integration. For example, one participant shared that technology should be used to help prepare students for the future; yet, the PTA spent a large portion of their technology budget on Study Island. Much of the professional world requires adults to use technology to problem solve, evaluate information, communicate, and collaborate (Coiro & Dobler, 2007; Ertmer & Ottenbreit-Leftwich, 2010). Since Study Island is a digital tool focused on test-preparation and skill review, it does not match the goal of preparing students for digital skills they will need. During the PTA Focus group, I also learned that the PTA would no longer carry a technology line item in their budget, citing a change in their priorities and increased district support for technology.

**Mini-grant Application.** The PTA participants reported that instead of a technology line item, they would support technology related items through their teacher mini-grant program. The PTA mini-grant program began in 2013 as a way to provide funding to teachers for specific projects. Teachers complete an application, describing their project idea, what they would like to purchase, and how many students it will impact. I used data collected during the PTA Board focus group and the course content from the Schoology modules to create an addition to the existing PTA mini-grant application, specifically for iPad app purchases.

Participants in the focus group shared that they trusted teachers as experts to know what technology is needed for teachers and students. With the iPad app mini-grant application, teachers are asked to identify particular features of the app and how the app will contribute to instruction. One of the requests from the focus group was
that teachers think strategically about mini-grant applications so that the funding can reach many students. With iPad apps, especially with shared carts, many students can benefit from the purchases. The apps will stay loaded each year, reaching a new group of students. With the shared iPad carts, the app is theoretically available to any student at CES. The addition to the mini-grant application allows teachers and PTA board members to evaluate an app before purchase and fund those that align well to instructional goals.

Using technology for family engagement. Participants in the focus group shared that the priorities for the PTA had shifted. As of the fall of 2017, they were no longer focusing on funding school initiatives like technology; but, instead were focusing on family engagement. As a teacher, I have primarily seen this focus play out as school-wide evening social events. In 2017-2018, the PTA created a new evening event named “Owl Fest,” where families spend time together with food trucks, music, and activities.

Using technology to increase family engagement should not be overlooked. Data from the teacher survey showed that less than half of respondents had students using technology to communicate beyond the walls of their classroom more than once a marking period. In my PTA artifact, I propose that the PTA to utilize technology to increase family engagement by increasing the thoughtful use of a digital tool designed for teachers, parents, and students. The administration at CES has already directed teachers to set up classes using the app Seesaw. Many teachers currently use it to post class photographs and communicate between teacher and parent. The tool can also be
used to help students communicate their learning with their parents, giving them an authentic audience for their work and increasing the engagement of families in day to day classroom activities. I suggest that the PTA build on the current use of Seesaw and provide opportunities to teach teachers and families how these learning journals can be used to increase the engagement between families and classrooms.

**Infographic**

Following the teacher survey, administration interview, and PTA focus board, I used the data to create an infographic using the website, *Piktochart*. The infographic was designed to make connections between these three pieces of data and highlight the most important points. The infographic provides stakeholders with a visual representation of data and can help improve their recall of information (Dunlap & Lowenthal, 2016).

The infographic consists of five sections. First, I reported data on the number of devices currently present at CES. While access does not ensure effective use (U.S. Department of Education, Office of Educational Technology, 2016), these numbers help provide context for viewers of the infographic. Second, I examined the survey results for information about teachers’ perception of access and their top three purposes for using technology. Since my plan was to design professional learning surrounding the topic of lesson planning, I also reported data about teachers’ frequency of planning with content and technology standards in mind. The fourth section of the infographic represents the technology integration goals of the PTA
board and administrators, as reported in the focus group and interviews. Finally, I highlight the top four professional development needs, as indicated by CES teachers.

My intention is to share this infographic with CES administrators in order to provide an overview of current practice and a proposed path for professional learning. Teachers may also find the information helpful in understanding administrator and PTA technology integration goals. The PTA may be able to use data in this infographic to guide future funding decisions. The infographic is intended to stand on its own without much explanation (Toth, 2013); however, for the purposes of my ELP, I included an accompanying document clearly describing the data points.

**Conclusion**

As access to technology increased at CES, there has not been a change in expectations for teacher practice. Technology use varies among teachers and the vision for what technology integration should look like at CES is unclear. My improvement activities are focused on working towards a clear vision for technology integration. The major piece of this endeavor was creating a series of design-based online professional learning modules. The activities in the modules were heavily influenced by my literature review of technology integration and professional development. The data from the teacher surveys and administrator interviews provided insight about current needs at CES, which influenced my decision to include an app evaluation tool and engage teachers in digital tools that fostered collaboration. The work in the professional development modules, along with information from the PTA focus group, also led to the creation of PTA mini-grant application for iPad apps.
The infographic connects the data from all three stakeholders and highlights important points to consider going forward. Each of these pieces, when woven together, present a path towards creating a shared vision of technology integration at CES.
Chapter 4

IMPROVEMENT STRATEGY RESULTS

Introduction

This chapter highlights my reflections on strengths and challenges of the design and content of my Schoology professional learning modules. I provided an overview of literature which guided the creation of these modules. This review includes literature surrounding the topics of the TPACK Framework, developing TPACK, approaches to professional development, and creating change in teachers’ pedagogical beliefs and practices. A more detailed literature review can be found in Appendix B. Following this review, I outline how this literature directly connected to the creation of my Schoology modules. In the remainder of the chapter, I reflect on the strengths of the professional learning, the challenges that remain for technology integration, and possible next steps for technology integration at CES.

Review of the Literature

Using TPACK in lesson design. Designing lessons that effectively integrate technology requires more than simply being tech-savvy. Effective technology integration requires teachers to have content, pedagogical, and technological knowledge as well as an understanding of how these domains influence each other (Koehler & Mishra, 2009). At the heart of technological pedagogical content knowledge (TPACK) is the idea that “teaching and learning can change when
particular technologies are used in particular ways” (Koehler & Mishra, 2009, p. 65). Introducing technology into instruction has the capability to affect what content is covered, the process in which something is taught, and the way children share their thinking. Simply adding more digital devices into the classroom is not enough. To be effective, teachers need to learn how to draw simultaneously on their content, pedagogical, and technological knowledge to make thoughtful decisions about how to use technology in the classroom (Niess, 2011).

Hutchison, Beschorner, and Schmidt-Crawford (2012) observed how a fourth-grade teacher made instructional decisions based on the TPACK framework. The teacher began with an instructional goal. Then, she found a digital tool which supported this goal. In evaluating the chosen tool, she found it allowed students to organize their ideas in a way not possible with a traditional worksheet. This type of instructional planning, which asks teachers to draw on their existing PCK, keeps the focus on instructional goals, and leverages technology to transform instruction. Technology becomes essential to instruction and not seen as a separate skill (Harris, Mishra, & Koehler, 2009).

**Developing TPACK.** Drawing upon existing PCK is one model for developing TPACK in teachers (Harris, Mishra, & Koehler, 2009). In this model, teachers increase their TPACK by building upon their already established pedagogical content knowledge. This particular strategy is useful for in-service teachers because they have years of experience developing their knowledge of content and internal catalog of instructional skills (Koehler, Mishra, Kereluik, Shin & Graham, 2014).
Hutchison and Woodward’s (2013) Technology Integration Planning Cycle is an example of this strategy. As teachers design technology-integrated lessons, they begin with their instructional goal and instructional approach. Then they choose a digital tool and assess its ability to contribute to instruction and how the tool may create opportunities for learning new digital skills as well.

**Approaches to professional development.** Koehler and Mishra (2009) suggest that many approaches to teachers’ professional development offer a one-size-fits-all technique to technology integration when, in fact, teachers operate in diverse contexts of teaching and learning” (p. 62). These types of professional learning, “one-shot workshops” (Lawless & Pellegrino, 2007), are the common one day or two-hour workshops where teachers are taught how to use a specific tool. Unfortunately, these types of content-neutral trainings usually fall short. First, technology itself is constantly changing and so the knowledge needed to operate the most recent tools shifts quickly (Mishra & Koehler, 2006). Secondly, one-shot workshops do not meet the needs of in-service teachers because they are often disconnected from their everyday practice (Lawless & Pellegrino, 2007).

Design-based approaches alleviate some of that disconnect. Within design-based approaches to professional development, teachers are learning about technology within their own teaching context. A design-based approach moves technology professional development away from being content-neutral, in which presenters make an assumption that learning a new technology will automatically improve teachers’ ability to teach with technology (Mishra & Koehler, 2006). Instead, design-based
professional development allows for situated, context-based learning that considers the grade level, subject matter, and devices available to teachers and students.

Harris and Hofer (2011) studied seven teachers’ involvement in a design-based approach to professional development. Within the five-month professional development, teachers planned lessons based on their content, using digital tools to support various learning activities. Findings suggest that as teachers learned about activity types for different content areas and what digital tools matched those activity types, they began considering how technology supported learning as opposed to thinking of technology as something separate. The study demonstrated that organizing technology professional development around content and instructional activities could be useful for in-service teachers.

Creating lasting change. Integrating technology effectively requires a change in practice for many teachers. Like any change, there are several variables that play a part. Ertmer and Ottenbreit-Leftwich (2010) suggest that teachers need to increase their knowledge and self-efficacy as well as change their pedagogical beliefs before being able to change their teaching practice. Teachers increase their knowledge by learning about technology itself; but, also by learning about how affordances of digital tools can support instructional goals. Teachers can gain confidence and improve their self-efficacy by experiencing small moments of success as they learn and by working alongside skilled colleagues. Changes in pedagogical beliefs come from situating learning in context to increase the perceived value using technology.
These types of changes were evident in Mouza’s (2009) longitudinal multi-case study of the long-term effects of research-based technology professional development. Two-years after the professional development, teachers were able to sustain much of their technology skills as well as continue to explore and experiment with new digital tools in their classroom. Mouza (2009) attributed this to the “cyclical change process” (p. 1228). After teachers learned about and experimented with new technologies in their classroom, they then reflected on the learning outcomes for their students. Reflecting on these positive outcomes increased their confidence and persuaded teachers to alter their beliefs about technology in the classroom. As their beliefs about technology changed, teachers found themselves encouraged to continue exploring new ways to use technology in the classroom.

Lawless and Pellegrino (2007) describe reflection as an essential component to effective professional development. Opportunities to share with colleagues and reflect on their learning contributes to teachers’ sustained growth and the establishment of a collaborative community. Providing opportunities for reflection, not just encouraging the process, was an important part of Mesmer and Karchmer’s (2003) professional development for the Reading Excellence Act. Their recursive professional development model allowed teachers to cyclically learn new content, apply what they learned to real-world classroom practice, and then reflect upon the effectiveness of those practices.

**Connecting to literature.** In my ELP, I created a plan to develop teachers’ TPACK through professional learning modules, using a design-based approach. I
aimed to create professional learning that focused on developing teachers’ TPACK by building on their existing pedagogical content knowledge. My goal was to create a learning environment that was situated in context, taking into account the grade level, subject areas, and devices used at CES. Additionally, I wanted to provide opportunities for teachers to reflect and collaborate with others when possible.

**Reflections on Strengths of Schoology Modules**

**Research-based frameworks.** Using a design-based approach (Lawless & Pellegrino, 2007), three research-based frameworks informed the creation of the professional learning modules that were part of this ELP. The modules were intended to build teachers’ TPACK. To do so, I introduced teachers to the Technology Integration Planning Cycle (Hutchison & Woodward, 2013). I used the knowledge processes outlined by Cope & Kalantzis (2016) to design learning activities that engaged teachers in experiencing, conceptualizing, analyzing, and applying content. In this section, I describe how I used the frameworks to guide my work and the benefits these frameworks provided to the design of my professional learning modules.

**TPACK.** I focused my goal for professional learning on developing teachers’ TPACK. Koehler and Mishra (2009) describe teaching as a “complicated practice that requires an interweaving of many kinds of knowledge” (p.91). The TPACK framework focuses on understanding three domains of teacher knowledge and weaving those domains together in effectively integrating technology. A visual representation of this framework can be found in Chapter 1, Figure 1.
Possessing technological pedagogical content knowledge is more than just possessing content, pedagogical, and technological knowledge as separate domains. To date, most technology-based professional development at CES has been focused on the technological skills needed to operate a digital tool. This builds teachers technological knowledge; but, continues to keep it separate from the other domains of knowledge teachers use for instructional planning. I wanted to create an opportunity build the specific knowledge needed to flexibly move between knowledge domains and understand how they affect one another during instructional design. Developing TPACK is essential for effective teaching with technology (Mishra & Koehler, 2006).

I designed my professional learning modules to build teachers’ technological pedagogical content knowledge by using “existing knowledge as a springboard” (Ertmer & Ottenbreit-Leftwich, 2010, p. 273). To do this, I engaged teachers in lesson design using the Technology Integration Planning Cycle (Hutchison & Woodward, 2013). This method of developing TPACK falls in line with a design-based approach (Lawless & Pellegrino, 2007) and allows professional learning to be delivered with context. A design-based approach allows for direct application of learning to classroom practice (Ertmer & Ottenbreit-Leftwich, 2010).

*Technology integration planning cycle.* Driving my design-based approach was the Technology Integration Planning Cycle developed by Hutchison and Woodward (2013). The planning cycle was developed for use with literacy instruction; however, I found the steps of the cycle to be easily generalized for any content area.
Each module modeled how to identify an instructional goal, plan instructional approaches, choose a digital tool, and evaluate that digital tool for contributions and constraints to instruction. An illustration of the planning cycle can be found in Figure 2. By introducing this cycle to teachers, and allowing them to go through the process themselves, teachers were encouraged to design lessons that were not driven by technology, but instead used technology to best support their instructional goals.

![Technology Integration Planning Cycle](image)

*Figure 2. Technology Integration Planning Cycle. (Hutchison & Woodward, 2013).*

In a way, I also used the planning cycle to integrate technology into my Schoology modules. I began with what knowledge I wanted teachers to learn and be able to apply by the end of the module. I considered how teachers would be working online and that I wanted there to be an element of collaboration. To accomplish these
learning goals, I chose tools like Padlet, Google Apps, and FlipGrid. After I chose those tools, I evaluated how they can contribute to teacher learning. For example, using FlipGrid allows teachers to have an asynchronous discussion about a topic and respond to each other. Google apps allow teachers to create a collaborative document. Padlet allows teachers to share resources and comments with one another. I also considered how using these tools may constrain teacher learning. Primarily, I did not want the learning curve of using each digital tool to overshadow the topic of conversation. To help overcome this, I chose tools that were user-friendly. I provided how-to guides and screencasts to assist teachers in understanding the basics of the tools. Throughout the process of designing the modules, I consistently reflected to be sure that my instructional goals could be met using the digital tools I had chosen.

Professional learning should show teachers specific ways to use technology tools in context (Ertmer & Ottenbreit-Leftwich, 2010). This is why I chose to focus on building teachers’ understanding of how to design instruction that integrates technology instead of simply how to use digital tools. At CES, professional learning about technology has been focused on specific tools. Even with that knowledge, only five out of thirteen respondents in the teacher survey reported having students use technology to access resources and information as a part of classroom activities at least weekly. Informally, as a teacher at CES, some colleagues have shared with me that using technology is unnecessary at their grade level or that they do not integrate technology because they are not tech-savvy themselves. I wanted to flip what has occurred so far: starting with a digital tool and trying to fit it into instruction. Instead,
I wanted to create professional learning that built upon their already existing pedagogical content knowledge, showing digital tools as a way to strengthen and transform instruction. Of course, in order to choose digital tools for instruction, teachers need a menu of tools to consider. Instead of directly instructing teachers on how to use specific tools, I chose to provide menus for exploration and integrate tools into my own activities that can be used across grade levels and content (Padlet, Google Apps, FlipGrid). Reflecting tools and pedagogical approaches that teachers can apply to the classroom is an additional supportive component to meaningful professional learning for teachers (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur & Sendurur, 2012).

**Knowledge processes.** Each module was structured to allow teachers to experience, conceptualize, analyze, and apply new content (Cope & Kalantzis, 2016). A table outlining examples of each of these processes can be found in Chapter 1, Table 1. These knowledge processes are not linear. Teachers flexibly move between them as they create meaning from the content of the activities. In each module, teacher knowledge is situated by drawing on prior knowledge. For example, in module one, teachers are asked to share with one another their current planning process for lessons that integrate technology. Throughout the modules, teachers are also introduced to new content. They make connections between what they have learned and their current practices. Teachers analyze and evaluate new iPad apps for their contributions to instruction and possible constraints on learning. At the conclusion of each module, teachers are asked to apply what they have learned to their
own context. This helps the professional learning stay design-based (Lawless & Pellegrino, 2007), and also reflects the ability to take what they have learned and apply it to real-world experiences (Cope & Kalantzis, 2016).

**Choosing Tools.** Professional learning for teachers should be relevant and authentic. Its design should reflect the needs and interests of teachers, the school, and the district (Hunzicker, 2011). In addition to situating what teachers learned into their own instructional contexts, I also considered the digital tools available to teachers at CES.

Money from the district, school, and PTA have funded purchases of SMART Boards, laptops, and iPads at CES. In the fall of 2018, teachers also received their own iPad. With no set expectations or plans for implementation, teachers may be thinking, “Ok, so we have iPads. Now what?” In an interview with the principal of CES, she alluded to this feeling when she spoke of how schools often give teachers “stuff” but then no guidance on how to use it appropriately. As the district continues its slow roll-out of 1:1 iPads in elementary schools, I wanted to incorporate the identification, evaluation, and integration of iPad apps.

Two other district initiatives had an impact on my instructional decisions. In the fall of 2018, all elementary schools in the district adopted the Bridges in Mathematics curriculum. This curriculum is published by the Math Learning Center (MLC), which also developed ten free iPad apps. Since the use of these apps are encouraged by the curriculum, I gave teachers an opportunity to learn more about virtual manipulatives and evaluate the MLC apps for their instructional use. Secondly,
I decided to incorporate SMART Lab activities into my Schoology modules. All of the classrooms at CES are equipped with a SMART board and have been for quite some time. There has recently been professional development initiatives at the district level to help teachers use SMART Lab activities. These activities are incredibly versatile and can be used for a variety of instructional activities and virtually any content.

**Reflections on Challenges**

**Changing technology.** One of the challenges of developing technology-based professional learning is that it has the possibility of becoming quickly outdated. Mishra and Koehler (2006) describe this challenge as a reason to stay away from context-neutral approaches to professional learning. If teacher learning overemphasizes the technology itself, teachers will lack the skills to make instructional choices about technology that support student learning. By approaching technology integration from a TPACK framework, I kept the focus of the modules on lesson design and kept instructional goals and student learning as the priority (Harris, Mishra & Koehler, 2009). Still, since some technological knowledge is also addressed, there are items to update over time. For example, the last module relies heavily on the use of SMART Lab activities. These activities, and the app used to access them, are important for my school. We have the technology available for students and the activities would allow teachers to use SMART boards in a more interactive and collaborative way. Although I believe focusing on these activities is beneficial, technology’s frequent changes could mean that this entire module could
easily become out of date if and when SMART changes their software. I do not feel that the possible constraint this puts on teacher learning outweighs the contributions learning about these activities could provide for students. Going forward with this module, I may need to update the activities to reflect any changes made by SMART.

**Building a culture of collaboration.** Establishing a positive school culture surrounding technology integration is another important factor leading to changes in instructional practice. Ertmer and Ottenbreit-Leftwich (2010) found that creating a positive culture, including support and opportunities for discussion, can impact teachers’ ability and willingness to change their current practices. Mouza (2009) also found that support from colleagues was an important factor in teacher learning. She found that collaborating with colleagues and sharing ideas helped teachers sustain their learning in the long-term. Schrum and Levin (2013) describe this as a “culture of peer-to-peer assistance” (p. 40) that exists as a form of informal professional development in exemplary schools.

Though there are opportunities for sharing through Flipgrid, Padlet, Google apps, and discussion boards - true collaborative partnerships are not an element of my professional learning modules. Considering that working with skilled colleagues and collaborating with peers helps sustain learning (Ertmer & Ottenbreit-Leftwich, 2010; Mouza, 2009), this element may need to further developed in the online modules. Creating these relationships among teachers may help contribute to a change in school culture (Ertmer & Ottenbreit-Leftwich, 2010) in which there is support and discussion opportunities for teachers experimenting with technology integration. I will be
meeting with the principal at CES to discuss how we can build a culture of collaboration, with a focus on technology integration. Specifically, I will propose teachers utilize the collaborative elements of the Schoology modules and use team meetings to plan and reflect upon instruction that integrates technology.

**Digital collaboration.** The final module is a summary, providing opportunities for reflection and collaboration. I included three discussion boards that I intend to leave open for teacher use: SMART Lab activities, Digital Tools, and Reflections on Teaching Practice. Many of the activities within the first four modules, though situated in context, are hypothetical. Teachers are brainstorming ways in which they would use technology in upcoming lessons; but, are not asked to act upon those ideas or reflect on the lesson afterwards. Since part of helping change teaching practices comes from gained confidence through success (Ertmer & Ottenbreit-Leftwich, 2010), I also wanted to provide opportunities for real-world application could help improve the possibility of long-term change. My intention is to use these discussion boards to continue to collaborative conversations beyond the course content. Teachers can continue to share digital tools they are considering, SMART Lab activities they have created for their content, and reflections on how technology integration is going in practice.

Schoology could be used continually to encourage a recursive cycle (Mesmer & Karchmer, 2003) of learning, applying, and reflecting on new strategies. Teachers could set up their own Schoology groups, as opposed to a course, by grade level or subject area. Within these groups, teachers could upload questions, reflections, or
even videos of instruction with requests for feedback. Notifications allow teachers to get e-mail reminders when someone comments or adds content. Schoology can become a digital space for teacher reflection and collaboration.

**In-person collaboration.** Professional learning communities (PLCs) is a broad term used to describe a number of groupings of teachers in different schools (DuFour, 2004). When it comes to promoting technology integration, Schrum and Levin (2013) describe PLCs as one method used by exemplary schools. At CES, PLCs are grade level groups that meet once every five school days during the last hour of the instructional day. The focus of the meeting is flexible and generally chosen by the grade level team. Teachers center their discussion on one of the following topics: using data, collaborative lesson design and planning, reviewing student work, problem solving, and decision making. Within these choices, it is possible for grade level teams to continue their work with technology integration within PLC meetings. In my meeting with the principal of CES, I intend to propose teachers utilize PLC time to work through the planning cycle together, prioritize learning goals, and make thoughtful choices about technology. This would also provide opportunities for teachers to reflect together after conducting the lessons and make changes as necessary for future instruction. This process would fit the PLC focal point of “collaborative lesson design and planning.”

Additionally, CES teachers host one grade level team meeting a month after school. Though these are not called “PLC meetings” by our administration, they have a similar purpose of professional learning. Currently, these meetings are conducted as
a professional book club. Teachers each read a text on the topic of Responsive Classroom, share helpful information, and discuss real-world applications. I plan to propose this time an alternative to the PLC meetings that occur during the instructional day. Team meetings would also work as an ideal opportunity for teachers to collaborate and design instruction that utilizes technology. If this time is used, I would also be available to guide teachers through instructional planning and provide in-person support.

**The need for a plan.** A school needs more than a focus on professional development to affect change in teacher practice (Schrum & Levin, 2013). Many of the challenges or limitations in my current online professional learning program can be overcome through thoughtful planning and use of resources; however, there still needs to be a greater sense of vision and accountability for teachers. A lack of planning can cause a gap between what technology looks like in the world and what we are doing in schools (Lim, Zhao, Tondeur, Chai & Tsai, 2003). In order to close that gap, schools need a well-communicated plan.

Ertmer and Ottenbreit-Leftwich (2010) describe school leadership as “a critical factor in facilitating teacher change” (p. 275). Implementation of technology in schools requires developing a school culture where there is a supportive environment for teachers, opportunities for professional learning, and time set aside for collaboration with colleagues (Groff & Mouza, 2008). Creating this culture and a shared vision for technology is the responsibility of education leaders (U.S. Department of Education, Office of Educational Technology, 2016; Ertmer &
Ottenbreit-Leftwich, 2010). The International Society for Technology in Education (ISTE) also highlights the importance of facilitating a vision and strategic plan for technology integration in standards for Education Leaders (ISTE, 2016).

Teachers at CES are certainly supported when it comes to taking risks with technology. They are encouraged to try new things and look at failures as opportunities for growth. What is missing, though, is that shared vision and understanding about how teachers can leverage technology to transform teaching and learning. Without a plan in place, professional learning opportunities have been limited in their quantity and focus. Time may be available for PLCs; but, the importance or possibility of using this time to reflect or collaborate on technology integration has not been discussed. Perhaps, if as a school CES can develop a shared vision that includes technology in its definition of good teaching, then we can begin a ripple effect of enhanced professional learning, improved teacher confidence, and the establishment of a positive culture surrounding technology integration.
Chapter 5

REFLECTION ON IMPROVEMENT RESULTS

Each of the improvement activities were envisioned to help create opportunities to improve technology integration at CES. The long-term goal is to create a vision for technology integration where teachers have a clear understanding of why and how technology should be used, expectations for what is considered best practice are in place, and support is present for teacher learning and accountability. This is a big undertaking and requires input and action from teachers, administration, and parents. Throughout the course of my Ed.D. program, there have been changes in leadership at CES, changes to technology funding, and changes in priorities. Some of these changes have been beneficial for my project and also for technology integration at CES; however, I recognize that there are still barriers to fulfilling the long-term goal of a vision for technology integration. As an educational leader, I have a meeting scheduled with the principal at CES to address some of these barriers and propose options to guide CES towards this long-term goal.

Changes in Administrative Leadership

During the course of my Ed.D., the principal of CES retired and a new principal from outside the district was hired. There were some noticeable changes with regards to technology as we shifted to new leadership. A few additional learning opportunities were offered for teachers. In September of 2017 and 2018, there were mandatory sessions to
assist teachers in setting up classroom Seesaw for Learning accounts. During the 2017 – 2018 school year, grade level teams were visited by an Apple Learning Specialist for a short presentation during their PLC meeting. In January of 2018, teachers were encouraged to share apps they were using in the classroom as part of the principal’s “Appy New Year.” In this activity, each day a teacher shared how they were using an app for instruction. In September of 2018, the principal supported teacher-led professional learning opportunities by offering “snow hours” (hours accrued to make up for snow days in winter) to participants.

In my interview with the new principal, I learned she wanted to see technology used to engage students, increase collaboration, and communicate with others. She had visions of using technology for unique and creative purposes, and not just as a replacement for paper and pencil activities. She shared a desire for continuous professional development and teachers sharing with each other.

**Impact.** Being new to the school has created some barriers for implementing some of the principal’s ideas. As a teacher at CES, I have learned that within the principal’s leadership style she does not make quick changes, no matter her beliefs. She likes to explore what is already happening and then create small changes with a substantial amount of input from staff. This is true with technology as well. We have seen small changes. The additional technology professional development - Seesaw, Apple, Appy New Year - were all with good intention. Unfortunately, as one-shot learning opportunities they come with very little follow-through or impact on teachers’ practice (Lawless & Pellegrino, 2007).
There is a sense of support for teachers wanting to integrate technology and this is helpful; however, teachers need more than a good support system to make changes in their practice. The principal has stated that she believes improving technology integration will require continued professional development; yet, professional development in technology integration is not mandatory for teachers. In order to become effective at integrating technology, teachers need to increase their knowledge, improve their self-efficacy, and create change in their pedagogical beliefs before changing their practice (Ertmer & Ottenbreit-Leftwich, 2010). The online professional learning modules I have created, alongside follow-through and teacher accountability can help teachers begin to make these changes. All modules help teachers increase their knowledge by learning about specific tools and more importantly learning how contributions of digital tools can support their instructional goals.

**Next Steps.** In my upcoming meeting with the principal of CES, I plan to propose a roll-out of my Schoology modules alongside in-person collaborative planning and reflection. First, as a leader of the voluntary technology-based professional development at CES, I plan to pilot these modules with the small group of teachers that are currently attending the trainings. My proposal is to begin this pilot in March, as a replacement for our next scheduled after-school professional development. After gathering feedback through this pilot group, my suggestion is that this be used for all teachers within their grade level PLC or team meetings beginning in the Fall of 2019. Research tells us professional development should be recursive. Teachers need opportunities to learn new content, apply that knowledge to classroom practice, and
reflect on their experiences (Mesmer & Karchmer, 2003). Teachers’ reflections on positive outcomes can increase their confidence, persuade them to alter their beliefs about technology integration, and further push themselves to explore new ways to use technology (Mouza, 2009). Support from colleagues can also have an impact sustaining learning long-term (Mouza, 2009). By utilizing PLCs and grade-level team meetings for collaborative planning and reflection, CES could provide teachers opportunities to discuss new ideas, implement them in their classroom, and reflect on their experiences.

Changes in Funding

As I worked to complete my ELP, funding changes occurred within the district and the PTA. These funding changes directly impacted the presence of technology at CES; but, have not had a large impact on strategies to improve technology integration.

**District funding.** In 2016, the school district passed their referendum which included support for the 1:1 iPad program in the middle schools. The proposal detailed a replacement cycle where each year, the 6th grade would receive new iPads and use those until they were in 8th grade. This indirectly affected the presence of iPads in the elementary schools. As the 8th grade students graduated, those iPads were still in good condition. So, the district has cycled down those iPads to begin 1:1 programs in 4th and 5th grade in the last two years.

**PTA funding.** In some ways, the changes in district funding directly impacted the changes in PTA funding. In past funding initiatives, the PTA purchased laptops and iPads. Since the district was going to begin cycling down devices from the middle school, the PTA felt there did not need to be as much of a focus on purchasing devices.
This, alongside administrative changes at CES, caused a shift in priorities towards family engagement. The technology line item was removed from the budget along with the fundraising events attached to previous technology purchases.

**Impact.** The change in funding itself has not been a barrier for technology integration. In fact, if anything, CES will continue to *increase* their devices through the district replacement program. Therefore, taxpayer dollars are indirectly supporting the increase in technology at our school. The challenge continues to be how to cultivate a culture of effective technology integration as opposed to simply increasing technology presence. Access to technology does not necessarily increase use or improve learning (U.S. Department of Education, Office of Educational Technology, 2016). To date, money has been used to purchase devices; but, many teachers are still unsure of what to do next. I propose that CES move away from looking at technology as something that needs large amounts of funding and instead, as something that needs vision, professional learning, and accountability. I intend to help guide this shift by implementing my plan to refocus our professional learning on instructional planning instead of specific digital tools. This includes the roll-out of the Schoology modules as well as in-person collaboration during PLC or grade level team meetings.

**Changes in Priorities**

During my time in the Ed.D. program, CES made changes to its vision statement and the School Success Plan with regards to technology. As previously mentioned, the PTA also made changes to its priorities, focusing on family engagement and removing the technology line item. As a teacher at CES, I have not noticed large effects of these
changes; however, they are important to note. These changes represent, even if only symbolically, our school’s view on the use of technology at CES.

**School vision.** In the spring of 2017, I reviewed the school website for mentions of technology. I found this mention under the school vision. At the time, the school vision contained a statement that “all staff members will be provided with in-service training to successfully implement technology into all curricular areas” (Center Elementary School, 2017). Soon after, the former principal asked staff to revise the school vision to make it more of an overarching goal. The revised version of the vision statement read, “collaboration, communication, critical thinking and creativity will empower students to impact the global society” (Center Elementary School, 2017). While the need for technology to accomplish these goals could be inferred, the concise nature of this revised vision removed any concrete commitment professional learning and technology integration.

**School Success Plan.** Similarly, the School Success Plan has had pieces about professional learning removed over the years. Unlike a school vision, the School Success Plan is a document revised every year. The School Success Plan outlines initiatives for the year and, once approved, is a part of the district’s consolidated grant. In 2016, the School Success Plan outlined purchases of iPads for 15 staff members, researching trainings about “apps and programs that will enrich student learning,” and having select teachers train other members of the staff. Though written in the School Success Plan, this was not fulfilled. In 2017, mentions of technology were only in regard to parent-teacher communication like blogs and Seesaw. In 2018, the proposed School Success
Plan mentions specific programs, such as Reading Eggs and RAZ Kids. Each of these changes represent the way in which the school is focusing on technology. In both 2016 and 2018, the School Success Plan mentions using iPad apps; but, in 2018 the focus is specifically on content-based apps and there is no mention of teacher learning or teacher leaders.

**PTA priorities.** During my focus group with members of the PTA board, I learned that the PTA would end funding for their technology line item. While this funding change was partly due to changes in district funding for technology, it was also influenced by a change in overall priorities. The members of the focus group shared that each year, they meet with administration to learn about school needs and decide where they should place their efforts. They expressed that with the shift in administration in 2017 – 2018, they had been asked by administration to concentrate on family engagement activities.

**Impact.** Changes in how CES refers to technology, in both the vision statement and School Success Plan, may be even more important than the financial changes occurring at CES. Previous funding has allowed CES to continuously add devices. Yet, teachers’ use of the technology has been inconsistent. A lack of clear vision could be a contributing factor to this problem. Without clear expectations, teachers do not have a guide for how to integrate technology or accountability to change their practice. Looking at the CES website, a parent would not know what digital skills students are learning or how they are using technology to create, collaborate, and communicate. Families know
that money has gone to support an increase in devices. They would not know any follow-up on how those purchases have been used.

The artifacts I have created begin to pull together some strings in this gap. Data from the teacher survey gives information on how some teachers are currently using technology, their views on technology integration, and in what areas they would like to receive more learning opportunities. I created my learning modules to address some of these needs based upon best practices from the literature. I created the iPad app request for the PTA mini-grant program to help teachers show how they intend to use technology in their classroom.

Each piece I have created for my ELP can help provide information for the bigger picture. A barrier still remains. Teachers need to understand what is expected of them, and why it is important. The School Success Plan is based on our school’s priorities. When the only mention of technology is in the purchase of content-based apps, this presents a lack of understanding of how students can use technology to create, collaborate, and communicate.

**Next steps.** In a position statement on improving digital practices, the International Literacy Association (2018) states, “instead of placing trust in the latest gadget, faith must be placed in the expertise of teachers to sustain classrooms that reflect the contexts of learning that are encountered outside of schools and in the real world” (p. 2). The real world does not use technology simply for its “skill and drill” abilities. In the professional world, people use technology to work collaboratively, evaluate information, problem solve, and communicate with colleagues (Ertmer & Ottenbreit, 2010; Coiro &
Dobler, 2007). My arranged meeting with the principal at CES proposes a plan that helps teachers understand the value of technology integration, lays out the skills students need, and creates a plan for ongoing professional learning and support.

In this meeting, I also plan to propose an additional item to address the PTA shift to family engagement. Members of the PTA focus group shared that teachers were utilizing various digital tools to communicate with families: Seesaw, Schoology, Remind, and weekly e-mailed newsletters. They described a concern that the number of digital tools teachers used left parents feeling overwhelmed and confused on where to look for information. In preparation for my meeting with the principal of CES, I have outlined a plan to streamline communication with families. The proposed plan begins in the fall of 2019, to give both teachers and families a fresh start and not increase confusion. First, I propose teachers streamline communication by primarily using the app Seesaw. All classes at CES are currently using Seesaw, so this will not be a new digital tool for teachers, students, or families. I chose to focus on Seesaw because of the abilities to replace the functions of Remind and weekly e-mail newsletters. The messaging feature in Seesaw can replace Remind texts. Weekly e-mail newsletters can be uploaded as PDFs or written as a Seesaw note.

Seesaw cannot replace the functions of Schoology; however, I believe the two tools can operate side by side as they serve different purposes. In my proposal, Schoology would still be used for delivering content for students and reporting grades. Seesaw would be used specifically for family engagement – adding photographs and
videos of the classroom, communication with families, and providing students with an authentic audience for their work.

Seesaw can also be used to facilitate family engagement, which aligns with the PTA’s primary focus. An additional part of my proposal to the principal of CES is to approach the PTA and in the fall of 2019 work with them to develop evenings for teacher and family learning. This is especially important if the principal agrees to rely primarily on Seesaw for communication. I plan to propose the PTA provide evenings Parent evenings could demonstrate how Seesaw can be used to connect with the classroom. To assist families who may be unable to access Seesaw from home, the PTA could provide time at the beginning or end of their meetings for parents to view their child’s Seesaw learning journal using school-owned devices.
Chapter 6

REFLECTIONS ON LEADERSHIP DEVELOPMENT

As a doctoral student, I was able to experience a new role: problem solver. My time in the Ed.D. program taught me how to identify a problem and become a leader in creating steps towards a solution. In 2016, when my school’s PTA re-evaluated its subscription to Study Island, I decided to focus on digital resources that could replace this program. My first step was to perform a content analysis of Study Island. In doing so, I discovered a misalignment between this skill review program and the first grade ELA standards. As I reflected on this misalignment, I realized that there was a bigger issue at hand. The money the PTA provided for technology was primarily being used to support a test preparation program instead of tools that truly supported day-to-day student learning and technology integration at CES. As I explored the direction of my ELP and informally spoke with administration and teachers, I saw how there was a disconnect between the number of devices and the lack of vision for how those devices should be used instructionally. My ELP then became about creating improvement strategies that could begin to close this gap and bring stakeholders together to create a clear vision in the future.

Reflections on Skills as a Scholar

This leadership role required me to increase my knowledge about technology in the classroom. To do this, I conducted a literature review about technology integration
and professional development. If my goal was to help create a vision, I needed to be knowledgeable about why teachers should integrate technology and research-based best practices for doing so. I also researched different types of professional development and the ways teachers could build their TPACK. Since I intended to create online professional learning modules, I needed to have a strong foundation for working with adult learners and teaching teachers about technology integration.

My work in the Ed.D. program also built my overall academic skills. As I developed my ELP, I learned how to synthesize information and use literature to drive my decision-making process. For example, as I read about the Technology Integration Planning Cycle (Hutchison & Woodward, 2013), I observed how well it aligned with strategies for building TPACK in inservice teachers. I considered how the steps in the cycle were easy to follow and could instill feelings of success and confidence for teachers. So, I chose to frame my professional development around this cycle.

**Reflections on Skills as a Problem Solver**

As a problem solver, the Ed.D. program has improved my ability to use data to make decisions. In my ELP, I arranged online surveys to reach teachers, one-on-one interviews to gain perspective from administrators, and a focus group to facilitate discussion about technology with our PTA board. As a teacher, I am accustomed to using data to make instructional decisions; however, my work in the Ed.D. program extended this ability and allowed me to use data to make leadership decisions.

I realized early on that creating a vision for technology integration was a large and long-term goal. This goal would require administration, teachers, and the PTA to come
together and put a focus on technology integration. My problem solving efforts became about utilizing data from each of my artifacts to create improvement strategies that represented the needs and concerns of the stakeholders. My literature review helped guide the content of my professional learning modules. I had also planned to include a menu of resources for teachers. When I analyzed the results of the survey and saw that 92% of teachers reported they would like professional development on identification, location, and *evaluation* of technology resources, I added an evaluation tool to the modules to help guide teachers’ understanding of the affordances of an app. I made sure elements of the professional learning represented collaboration, since that was something noted in the administrative interviews. I then took what teachers learned in the online modules and created an iPad app mini-grant application for the PTA, to create consistency.

**Reflections on Skills as a Partner**

The process of creating each of these artifacts also improved my ability to be a partner in education. In my courses, I was often the only elementary educator. It is easy as an elementary educator to get wrapped up in your own classroom world. Participating in discussion and projects with administrators, specialists, and high school teachers provided me with new perspectives. As a doctoral student, I was encouraged to get out of my comfort zone and work with other teachers, administrators, and parents to create plans for change in our school.

My work in the Organizational Problem Analysis and Planning in Education course taught me to consider the perspective of the important stakeholders and how to use
that to create stepping stones towards a vision that address their concerns. I created online professional development for teachers, addressing their needs from the School Technology Needs Assessment within research-based best practice. The online professional development demonstrated how elements of how technology can be used to be engaging and collaborative because that was part of how administrators viewed technology. I created an element to include in the PTA mini-grant proposal for iPad app purchases to help teachers and the PTA purchase apps that will best fit instructional goals.

**Reflections on Skills as a Leader**

The most profound impact of the Ed.D. program was on my leadership skills. Leadership in education had not been a role where I typically felt comfortable. Even after completing a Masters degree in reading and acquiring my certification as a Reading Specialist, I did not consider myself a leader or an expert. My work in the Ed.D. program has had an unexpected influence on my self-confidence and my ability to view myself as a leader.

As I completed my ELP, it ignited an unknown passion of mine - teaching teachers about technology integration. I truly enjoyed every moment of designing the professional development modules and choosing appropriate digital tools to introduce, apply, and reflect on content. Through this process, I have become more passionate about the thoughtful use of technology at every grade level. When a more experienced colleague recently approached me to share that she had no use for technology in the classroom, I did not step back with my typical non-confrontational response of “I
understand! You do what’s best for you!” Instead, I encouraged her to think about small changes she could make and about ways to use technology to support and extend what she was already teaching. I did this because I believe, now more than ever, that our students deserve it.

This past year, I took a leap of faith and - along with two of my colleagues - asked our administration if we could begin providing after school professional development to teachers who wanted to learn more about how to integrate technology into their instruction. It is voluntary, and only once every two months, but it is a start to closing a gap in knowledge and practice at our school. After completing my ELP, I realized that these attempts at adding professional learning continued to be focused on technological skills of specific digital tools. Therefore, I have planned a meeting with the principal of CES to shift the focus of professional development to include instructional planning using the Technology Integration Planning Cycle (Hutchison & Woodward, 2013), collaboration with grade level colleagues, and opportunities for reflection.

I started the Ed.D. program to learn more about educational technology. Mostly because I consider myself a lifelong learner and I enjoy a challenge. Whenever anyone asked me what I would do when I was finished, I would shrug and say, “Not sure, we’ll see.” Now that I am nearing completion of the program, I realize how grateful I am for this experience. With the support of the faculty and their constant push towards improving my skill set, I have grown tremendously. I can now see myself as a leader in the area of educational technology and the possibilities ahead for designing professional development and creating meaningful change for teachers and students.
REFERENCES


DuFour, R. (2004). What is a" professional learning community"?. Educational leadership, 61(8), 6-11.


Appendix A

CONTENT ANALYSIS

In 2012, Center Elementary School (CES) began using the internet-based program Study Island (www.studyisland.com) at all grade levels. After consultation with the principal, the PTA purchased a four-year subscription to the program. The subscription was funded by the PTA’s technology line item. Study Island followed the use of another program, IXL (www.ixl.com), which provided math practice in a similar format. Study Island provides students with both Language Arts and Mathematics practice. In fourth grade the program also provides Social Studies practice and in fifth grade, Science. Social Studies and Science are added at these grade levels to help support students for DCAS testing. Though CES teachers did not have access to grades outside of their population, Study Island advertises standards-based practice for students in Kindergarten through 12th grade.

In the Spring of 2016, the PTA discussed the possibility of renewing the Study Island contract for another four years. Teachers were informed that parents at a PTA meeting communicated teachers were not universally utilizing the program across classrooms. This was problematic due to the high cost of a four-year license. In the fall of 2016, the PTA asked our principal to have the staff decide – at each grade level - if Study Island was worthwhile for their students. The information was gathered
informally. Our principal asked grade level teams to decide and then have the team leader e-mail the decision. The first, second, and third grade teams shared they would prefer to discontinue using Study Island. Members of the PTA board decided to end the sponsorship of the program at CES due to cost and lack of interest.

Following the announcement that Study Island subscriptions would not be funded, CES’ fourth and fifth grade teachers shared concerns. They saw a great value in Study Island due to the capability to practice question stems similar to the Smarter Balanced assessment. So, the PTA decided to renew the license for fourth and fifth graders. A few weeks later, our school leadership team was told that the cost of adding on first, second, and third graders was minimal. For that reason, the PTA decided to renew the subscription at all grade levels. Study Island was available school-wide once again. During this renewal, Study Island cost $3,500 for a two-year subscription. It expired in December of 2018, after the completion of this content analysis.

At my grade level, the initial decision to discontinue Study Island was unanimous. While funding was made available, teachers had been using it very little or, in some cases, not at all. I was curious why first grade teachers were disinterested in the program. Since the program was made available again, I was also interested in investigating Study Island more closely to discover the benefits and limitations of the program. If I found that Study Island was more beneficial than teachers thought, I could provide insight to teachers on the how to better utilize the program. If the program showed limitations and gaps in first grade standards, I could explore alternate
ways for the PTA to spend their technology money. I decided to analyze the content of Study Island questions for their alignment to the standards. I focused on mapping the reading activities in literature, informational text, and foundational literacy skills to the Common Core State Standards. With each separate activity in the English Language Arts section, I began with the standards Study Island claimed were addressed. After listing those standards, I participated in the activity (10 questions), identifying the types of questions asked, and connecting the activities to the Common Core State Standards. Perhaps more importantly, I identified standards that were proposed for the activity, but not revealed in my sample. Last, I reviewed the teacher page for each activity and listed any additional teacher resources. The results from each activity can be found in Tables A1, A2, and A3.

**Content Analysis**

In an analysis of Study Island’s first grade English Language Arts activities, I found the connection to first grade standards to be inconsistent. Proposed standards were frequently not met, or only partially met, by their matching activity. Throughout the program, literature standards were at least partially addressed through the Study Island activities. Informational text standards were partially covered by Study Island activities. Foundational skills for reading were largely missing from the program.

Table A1 shows that the majority of literature standards were addressed by the activities presented on Study Island. The table also illustrates that some activities fell short of entirely meeting the standard. Missing from the literature activities was Standard RL.1.10. It was marked as “N.A.” on the Study Island website. This
standard asks students to read grade-appropriate poetry and prose with support and prompting.

Table A2 shows how several informational text standards were not addressed at all on Study Island. RI.1.1, RI.1.3, RI.1.4, RI.1.9, and RI.10 were not a part of any activities. RI.1.6 and RI.7 are loosely addressed in the Literature section of activities, but not the Informational Text section. Study Island suggests that RI.1.4 is connected to the Language activity “Using Context.” Though I did not review the language activities in this content analysis, I did look at the Using Context activity to see how it addressed RI.1.4. In this activity, students use context clues to identify the meaning of an underlined word. Students do not ask questions, a portion of the RI.1.4 standard, to help determine the meaning of words.

The foundational skills section appears to omit the most standards. This is illustrated in Table A3. This omission is particularly concerning at a grade level with many phonological awareness and phonics standards. The activities are marked as aligning to broad standards, but the Common Core Standards in Foundational Skills are broken down into specific skills for students. Many of these are not addressed in the activities, such as RF.1.2.A, RF.1.2.B, RF.1.2.D, RF.1.3.A, RF.1.3.B, RF.1.3.C, RF.1.3.E, RF.1.3.F, and RF.1.3.G. No fluency standards are addressed in these activities. Study Island claims fluency standards are “embedded” throughout the activities, however it is difficult to see how. In all reading activities, text can be read aloud and there is no expectation that students are reading grade-level text with accuracy or fluency. The print concepts standard RF.1.1 is also not covered in this
section. Study Island states this is covered in the language activities “Capitalization” and “Punctuation.” This content analysis only covered the reading activities on Study Island; however, I did review the capitalization and punctuation activities to assess their relevance to the print concepts standards. 100% of activities in the Capitalization activity asked students to identify which proper noun, holiday, month, or day of the week needed to be capitalized. There were no questions about the first word in a sentence, which is more specifically noted in the standard RF.1.1. In the Punctuation activity 40% of questions asked students to identify the correct usage of a capital letter in a sentence, which is not related to punctuation. 10% of questions asked students to choose the correct usage of an abbreviation containing a period (such as mr, mr., or Mr.), and 50% of questions asked students to choose the correct usage of punctuation in a sentence.
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<tr>
<th>Activity</th>
<th>Proposed Standards</th>
<th>Description of Questions</th>
<th>Additional Teacher Resources</th>
<th>Standards Addressed</th>
<th>Standards Not Addressed</th>
<th>Additional Notes</th>
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<tbody>
<tr>
<td>Asking and Answering</td>
<td>RL.1.1</td>
<td>2/10 - Students answer “who” and “what” questions; Answers found directly in text.</td>
<td>None</td>
<td>RL.1.1 - Students answer questions about the text on 4/10 questions. The other half of this standard asks students to generate questions to ask about the text. This is only loosely covered by this activity. Students do not develop their own questions, but instead choose a question that could be asked of the text.</td>
<td>RI.1.1 - This standard was not addressed. All of the questions used fictional stories and not informational text.</td>
<td>1 of the “Which question can be answered” questions had two possible answers.</td>
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<td>Questions</td>
<td>RI.1.1</td>
<td>2/10 - Students answer “why” question; 1 answer found directly in text and 1 requires inferencing.</td>
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<td>6/10 - Students identify which question can be answered by reading the text.</td>
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<td>Retelling Stories</td>
<td>RL.1.2</td>
<td>All questions asked students to summarize a short story (paragraph) into a one sentence retelling.</td>
<td>None</td>
<td>RL.1.2 - Students were able to demonstrate an understanding of the central message or lesson, though the activity was more closely related to summarizing or main idea. None of the questions asked students to identify key details from the story.</td>
<td>None</td>
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<td>Central Message and Lessons</td>
<td>RL.1.2</td>
<td>All questions asked students to identify the lesson learned from reading the text.</td>
<td>None</td>
<td>RL.1.2 - Students determined the lesson after reading the text. Identifying key details from the text was not addressed.</td>
<td>None</td>
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<td>Activity</td>
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<td>Characters</td>
<td>RL.1.3&lt;br&gt;RL.1.7</td>
<td>2/10 - Students identified why a character did something.&lt;br&gt;2/10 - Students identified which sentence from the story demonstrates a specific character trait.&lt;br&gt;6/10 - Students identify which word best describes a character.</td>
<td>Video Lesson Plan&lt;br&gt;In this lesson plan, students pretend they are a character from a text and describe how they feel at various parts in the text.&lt;br&gt;Advanced students write a story from the character’s point of view.&lt;br&gt;Struggling students practice reading parts of a story as if they are the character.</td>
<td>RL.1.3 - The character section of this standard is covered by the activity. Students describe the characters, selecting an appropriate character trait.&lt;br&gt;RL.1.7 - The character section of this standard is covered by this activity. Students use the text to identify the character trait. Students identify which detail from the story supports a specific character trait.</td>
<td>There were no questions asking students to identify the characters. The standard specifically calls for describing, but as a first grade teacher, I often start with identifying. The K.RL.1 standard asks students to identify characters with support.</td>
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<tr>
<td>Setting</td>
<td>RL.1.3 RL.1.7</td>
<td>1/10 - Students identify which sentence described the setting.</td>
<td>None</td>
<td>RL.1.3 - The setting part of this standard is covered well by this activity. Students select the appropriate word to describe the setting.</td>
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<td>1/10 - Students identify which illustration best shows the setting.</td>
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<td>RL.1.7 - The setting part of this standard is covered well by this activity. Students must use the text to select the appropriate word to describe the setting.</td>
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<td>2/10 - Students choose which item would be likely to appear in the story’s setting.</td>
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<td>6/10 - Students choose which word describes the setting.</td>
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<td>Major Events</td>
<td>RL.1.3 RL.1.7</td>
<td>All questions ask students to recall a detail from the story. All details are easily found in the text.</td>
<td>Video Lesson Plan</td>
<td>RL.1.3 - This standard was loosely linked to the activity. Students were asked to recall events, not describe them.</td>
<td>RL.1.7 - This standard was loosely linked to the activity. Students did not use the text to describe the events. They recalled them from the story.</td>
<td>RL.1.2 - This standard was more closely linked to the activities.</td>
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<tr>
<th>Activity</th>
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<tr>
<td>Appealing to the Senses</td>
<td>RL.1.4</td>
<td>2/10 - Students are asked to choose which sentence from the text supports how something looks, feels, smells, or sounds. 8/10 - Students are asked to identify which word shows how something feels, sounds, smells, or looks.</td>
<td>None</td>
<td>RL.1.4 - This activity covers the standard. It asks students to identify words from the story that appeal to the senses. In 8/10 questions the reader did not need to read the story to answer the question correctly. For example, one question asks “Which word tells how something looks? Blue, like, passed.” Without using the details in the text, a student could choose blue simply because it is the only adjective.</td>
<td>Though the standard mentions poetry, no poems were used in the questions.</td>
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<td>Categories of Writing</td>
<td>RL.1.5</td>
<td>1/10 - Students are asked to choose why informational text and stories are different.</td>
<td>Video Lesson Plan</td>
<td>RL.1.5 - This standard is only partially covered by this activity.</td>
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<td>Even though 9/10 questions asked if the text was a story, poem, or informational book, zero of the examples were a poem.</td>
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<td>Choices only describe stories. They do not discuss the differences between informational text.</td>
<td>Students identify a purpose for reading. Students are given background of how the texts are different. Advanced students play a board game to review the concepts.</td>
<td>Students identify the genre of the text. Only one question addressed some of the differences between the genres.</td>
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<td>9/10 - Students are asked to identify which type of writing they would find the text (poem, information book, story).</td>
<td>Struggling students review purposes for reading and sort texts by purpose in a small group with teacher assistance.</td>
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<td>Identifying the Speaker</td>
<td>RL.1.6</td>
<td>All questions asked students to identify the speaker in the story. 7/10 questions did not have a speaker with a name.</td>
<td>None</td>
<td>RL.1.6 - This activity partially aligns to this standard. It reviews who the speaker is in each text. The standard specifically asks students to identify who the speaker is “at various points in the text.” Since these are all short stories (paragraph), there are not opportunities to identify speakers at different points in the text.</td>
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<tr>
<td>Pictures and Illustrations</td>
<td>RL.1.7</td>
<td>3/10 - Students choose which picture matches the text.</td>
<td>None</td>
<td>RL.1.7 - This standard is covered by this activity.</td>
<td>RI.1.6 - This standard asks students to distinguish between what they learn from the text and what they learn from pictures. No questions asked students to do this.</td>
<td>In 10 questions, there were 2 examples from informational text and 8 examples from fictional text.</td>
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<td></td>
<td>RI.1.6</td>
<td>3/10 - Students identify what the words and pictures tell the reader.</td>
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<td>RI.1.7</td>
<td>4/10 - Students are asked to look at a picture and choose text (2 sentences) that match.</td>
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<tr>
<td>Compare and Contrast</td>
<td>RL.1.9</td>
<td>All questions ask students to identify how characters are different or alike. The ways they are different or the same are not very explicit for first graders. Assumptions are required on the part of the reader.</td>
<td>None</td>
<td>RL.1.9 - Students are asked to compare experiences of characters within a story, though the evidence for these comparisons may be difficult for a first grader to identify.</td>
<td>RI.1.3 - This standard was not addressed. Informational text was not used, so there were no connections made between ideas or information. RI.1.9 - This standard was not addressed. One text was used, so similarities and differences across two texts could not be addressed.</td>
<td>The questions identified something about one character (ex: Jack stole things) and did not address how the other character was different (ex: Jack has a red shirt. I have a blue shirt.). It had to be assumed from the text that the other character did not possess that trait or partake in that experience, because it was not explicit.</td>
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<tr>
<td>Main Topic and Ideas</td>
<td>RI.1.2</td>
<td>All questions ask students to tell what the text is “mostly about.”</td>
<td>None</td>
<td>RI.1.2 - This standard is briefly covered in this activity. Only 1 question was informational text. No questions asked students to recall key details.</td>
<td>RI.1.3 - This standard is not covered by this activity. The standard asks students to describe the connection between two people, ideas, or pieces of information. No questions addressed this during the session.</td>
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<td></td>
<td>RI.2.3</td>
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<td></td>
<td>RL.1.2 - These activities loosely match this literature standard. Students are asked what the fictional story is mostly about.</td>
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<td>Text Features</td>
<td>RI.1.5</td>
<td>1/10 - Students choose the heading in the text.</td>
<td>Video Lesson Plan</td>
<td>RI.1.5 - The standards say students should know and use “various text features,” but only gives examples of text features - not required ones to teach. This activity covers icons quite well; but, minimally addresses or leaves out other features.</td>
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<td>1/10 - Students select which heading would guide them to specific information.</td>
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<td>1/10 - Students are asked to sort a piece of information under the correct heading.</td>
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<tr>
<td>Text Features, Continued</td>
<td></td>
<td>1/10 - Students are asked where they will find a table of contents.</td>
<td>Struggling learners review parts of a book in a small group with examples of book covers and moveable labels for students to manipulate.</td>
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<td>1/10 - Students name a chapter in the book using the table of contents.</td>
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<td></td>
<td>5/10 - Students click on the icon to bring them to correct information on a webpage.</td>
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<tr>
<td>Supporting Points</td>
<td>RI.1.8</td>
<td>All questions ask students to identify the supporting evidence for the author’s opinion.</td>
<td>None</td>
<td>RI.1.8 - This standard is covered by this activity. Students identify the reasons the authors give to support their points.</td>
<td></td>
<td>Though this activity was in the Informational Text section, only 3/10 questions were non-fiction. The remaining questions were based on fictional stories.</td>
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<td>Syllables</td>
<td>RF.1.2 RF.1.3</td>
<td>3/10 - Students click on the word with two syllables.</td>
<td>Video Lesson Plan</td>
<td>RF.1.3 - The activities in this session are loosely tied to RF.1.3.D, which requires students to understand each syllable has a vowel sound and RF.1.3.E, which asks students to decode two-syllable words. This activity is not strong practice for these standards. Most of the activities in this section were pictures and audio, not words for students to read.</td>
<td>RF.1.2 - Though this standard mentions syllables in the description, the individual standards under it specifically address phonemes and not syllables. Counting syllables falls more appropriately into the RF.K.2 standards.</td>
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<td>3/10 - Students choose if a stated syllable came first or second in the word.</td>
<td>Students practice clapping out the syllables in words. Advanced learners read words in segments (ex: el-e-phant) and their partner names the number of syllables and says the word (ex: three syllables, elephant). Struggling learners work in a small group to clap out and cover up syllables. They play a game to practice the skill.</td>
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<td>4/10 - Students decide how many syllables a word contains after listening to an audio clip (supported with an image).</td>
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<td>Beginning Sounds</td>
<td>RF.1.2</td>
<td>All questions ask students to listen to the word and choose the correct beginning sound. All of the choices were sounds that appear in the word.</td>
<td>Video Lesson Plan</td>
<td>RF.1.2 - This activity is aligned to standard RF.1.2.C. Students are asked to isolate initial sounds in words. Students did not need to necessarily pronounce the initial phoneme since it was multiple choice.</td>
<td></td>
<td>The struggling learners’ worksheet mimics activities found on the NWEA MAP test, which CES students take.</td>
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<tr>
<td>Blending Sounds</td>
<td>RF.1.2</td>
<td>1/10 - Students choose which rime matches the onset to create a word.</td>
<td>Video Lesson Plan</td>
<td>RF.1.2 - This activity loosely fits RF.1.2.B. Students identify blends in words; but, in most questions students do not orally produce words by blending sounds together. In 1/10 questions, students did have to decide which parts of a word (in this case dr &amp; ive) would blend together to make a word.</td>
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<td>2/10 - Students choose which word (picture) contains a specific blend.</td>
<td>In this lesson, students are explicitly taught specific consonant blends. Advanced learners practice writing words with blends. Struggling learners work in small groups to pronounce and review letters that make up consonant blends.</td>
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<td>3/10 - Students are asked to fill in the blend that would create the word pictured.</td>
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<td>4/10 - Students are asked to identify which blend is present in the word (picture).</td>
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<tr>
<td>Ending Sounds</td>
<td>RF.1.2</td>
<td>2/10 - Students choose which sound comes at the end of 3 words (picture, with audio).</td>
<td>Video Lesson Plan</td>
<td>RF.1.2 - Similarly to the beginning sounds activity, this activity is aligned to standard RF.1.2.C. Students isolate final sounds in words (though some words contained more than one syllable). Students did not need to necessarily pronounce the ending sound since it was multiple choice.</td>
<td>Some answers without audio would be difficult for students to decode on their own earlier the year (ex: corner). Simply looking at the last letter would also lead to the correct answer.</td>
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<td>3/10 - Students identify the ending sound of a word spoken aloud.</td>
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<td>5/10 - Students click on the word that has the same ending sound as the picture.</td>
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Conclusion

The PTA used its technology budget to provide all grade levels with access to Study Island. Overall, the content analysis suggests that Study Island does not adequately meet the first-grade reading standards. The content analysis indicated that several standards in informational text were missing and almost all of the foundational skills were not addressed. This program missed the mark on a large part of the first-grade curriculum. Though this may not be the case in all grade levels, it may explain, in part, why first grade teachers preferred not to renew the Study Island contract.

Using a substantial amount of their technology budget, the PTA was symbolically saying that this program was an important investment for technology integration at CES. This is concerning for two reasons. First, at least at the 1st grade level, the analysis indicated this program did not accurately represent the Common Core State Standards in its activities. This problem was resolved when the PTA ended a subscription to the program in 2018. More importantly, Study Island is not representative of integrating technology in a way that promotes communication, critical thinking, or collaboration. This point was the catalyst shifting the focus of my ELP to improving the quality of technology integration at CES through a shared vision of best practices.
Common Core State Standards

**Reading: Literature**

RL.1.1  Ask and answer questions about key details in a text.

RL.1.2  Retell stories, including key details, and demonstrate understanding of their central message or lesson.

RL.1.3  Describe characters, settings, and major events in a story, using key details.

RL.1.4  Identify words and phrases in stories or poems that suggest feelings or appeal to the senses.

RL.1.5  Explain major differences between books that tell stories and books that give information, drawing on a wide reading of a range of text types.

RL.1.6  Identify who is telling the story at various points in a text.

RL.1.7  Use illustrations and details in a story to describe its characters, setting, or events.

RL.1.8  (RL.1.8 not applicable to literature)

RL.1.9  Compare and contrast the adventures and experiences of characters in stories.

RL.1.10  With prompting and support, read prose and poetry of appropriate complexity for grade 1.

**Reading: Informational Text**

RI.1.1  Ask and answer questions about key details in a text.

RI.1.2  Identify the main topic and retell key details of a text.

RI.1.3  Describe the connection between two individuals, events, ideas, or pieces of information in a text.

RI.1.4  Ask and answer questions to help determine or clarify the meaning of words and phrases in a text.
| RI.1.5 | Know and use various text features (e.g., headings, tables of contents, glossaries, electronic menus, icons) to locate key facts or information in a text. |
| RI.1.6 | Distinguish between information provided by pictures or other illustrations and information provided by the words in a text. |
| RI.1.7 | Use the illustrations and details in a text to describe its key ideas. |
| RI.1.8 | Identify the reasons an author gives to support points in a text. |
| RI.1.9 | Identify basic similarities in and differences between two texts on the same topic (e.g., in illustrations, descriptions, or procedures). |
| RI.1.10 | With prompting and support, read informational texts appropriately complex for grade 1. |

**Reading: Foundational Text**

| RF.1.1 | Demonstrate understanding of the organization and basic features of print. |
| RF.1.1.A | Recognize the distinguishing features of a sentence (e.g., first word, capitalization, ending punctuation). |
| RF.1.2 | Demonstrate understanding of spoken words, syllables, and sounds (phonemes). |
| RF.1.2.A | Distinguish long from short vowel sounds in spoken single-syllable words. |
| RF.1.2.B | Orally produce single-syllable words by blending sounds (phonemes), including consonant blends. |
| RF.1.2.C | Isolate and pronounce initial, medial vowel, and final sounds (phonemes) in spoken single-syllable words. |
| RF.1.2.D | Segment spoken single-syllable words into their complete sequence of individual sounds (phonemes). |
| RF.1.3 | Know and apply grade-level phonics and word analysis skills in decoding words. |
| RF.1.3.A | Know the spelling-sound correspondences for common consonant digraphs. |
| RF.1.3.B | Decode regularly spelled one-syllable words. |
| RF.1.3.C | Know final -e and common vowel team conventions for representing long vowel sounds. |
| RF.1.3.D | Use knowledge that every syllable must have a vowel sound to determine the number of syllables in a printed word. |
| RF.1.3.E | Decode two-syllable words following basic patterns by breaking the words into syllables. |
| RF.1.3.F | Read words with inflectional endings. |
| RF.1.3.G | Recognize and read grade-appropriate irregularly spelled words. |
| RF.1.4 | Read with sufficient accuracy and fluency to support comprehension. |
| RF.1.4.A | Read grade-level text with purpose and understanding. |
| RF.1.4.B | Read grade-level text orally with accuracy, appropriate rate, and expression on successive readings. |
| RF.1.4.C | Use context to confirm or self-correct word recognition and understanding, rereading as necessary. |
Appendix B

LITERATURE REVIEW

In order to investigate technology integration, develop my problem statement, and brainstorm ways to create a vision for technology at my school, I conducted a literature review of the research surrounding this topic. The following literature review describes theory and research in the areas of the Technological Pedagogical Content Knowledge (TPACK) Framework, how to measure and develop TPACK, the need for professional development, and how professional development in the area of technology has been organized.

Technology in Today’s Society

Technology is an integral part of today’s society, influencing social, professional, and academic lives. For instance, in 2015, 62% of households were considered “high connectivity” – having a laptop or desktop, a smartphone, and broadband Internet connectivity (Ryan & Lewis, 2015). In turn, increased access to Information Communication Technologies (ICT) has opened up new channels of communication with others (Leu, Kinzer, Coiro, & Cammack, 2004). This is important in understanding today’s social environment especially when as recent as 2016, 69% of adults participated in at least one social media site (Pew Research Center, 2016), and in 2015, 57% of teenagers reported making at least one friend online via social media or online game play (Lenhart, 2015).
Technology has not only made a social impact, but ICT also enables people to advocate for causes, research choices as consumers, and become more intimately involved in politics (Leu, Kinzer, Coiro, & Cammack, 2004). With all of the information available online, Leu, Kinzer, Coiro, Castek, and Henry (2013) argue that having the skills necessary to use the Internet “provides individuals with opportunities to make their lives richer and more fulfilling” (p.1154).

Much of the professional world also requires the use of technology as evident by the widespread use of ICT to increase workplace productivity (Purcell & Rainie, 2014). Ertmer and Ottenbreit-Leftwich (2010) argued that professionals across many careers work collaboratively and problem-solve differently due to the ubiquity of new digital tools. For example, video conferencing applications allow professionals to communicate with colleagues around the world inviting collaboration that was not possible without technology. Moreover, these digital tools require specific skills to evaluate and disseminate information (Coiro & Dobler, 2007).

Due to the growing need for skilled users of technology, it is important that educators prepare students in using technology proficiently to learn, collaborate, and communicate in both their professional and personal lives. In schools across the United States, access to ICT and reliable internet access is on the rise (U.S. Department of Education, Office of Educational Technology, 2016). Of course, access does not necessarily increase learning or usage (U.S. Department of Education, Office of Educational Technology, 2016). Thus, educational organizations such as the International Literacy Association and the National Council for Teachers of English,
as well as the Department of Education have developed standards to assist teachers in understanding the importance of technology integration. For example, the Common Core State Standards (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010) specifically state that students should be able to “use technology and digital media strategically and capably.” Within the English and Language Arts Standards, this is explicitly explained as using technology as a tool for researching, evaluating, and presenting content. Likewise, the National Education Association addresses technology integration in a statement available on their website (NEA, 2017). They comment on the importance of allowing students to have opportunities to use digital tools that they will likely face upon entering college or the workforce. They encourage the use of technology to transform educational experiences for students and advocate for professional development that helps teachers attain that goal. The International Society for Technology in Education also developed standards for technology use in education (ISTE, 2016). These standards are aimed at creating transformative learning experiences and empowering students to take charge of their learning. These various position statements and sets of standards aim to help teachers understand the value of integrating technology into their instruction and the skills students will need to proficient in using digital tools to communicate, collaborate, and learn.

**TPACK Framework**

TPACK is a research-based framework which addresses three domains of teacher knowledge – technological knowledge, pedagogical knowledge, and content
knowledge – as well as the way they interact and influence each other during instructional design. The TPACK framework builds upon Shulman’s (1986) work in pedagogical content knowledge. Shulman (1986) argued the importance of viewing the relationship between teachers’ pedagogical knowledge and content knowledge instead of simply viewing them as separate entities. There is some pedagogical knowledge that does not stretch across curricula; but, is specific to learning in one content area. As digital technologies became more commonplace in education, the need to add technological knowledge developed (Mishra & Koehler, 2006). During this time, Mishra and Koehler (2006) were also working to develop coursework to help teachers grow in their understanding of technology. Much like Shulman (1986), they found that looking at technological knowledge separately from content and pedagogy resulted in an incomplete understanding of how the affordances or constraints in using technology affect the content to be taught as well as how it will be made accessible for students. They argued that “teaching is a complicated practice that requires an interweaving of many kinds of knowledge” (Koehler & Mishra, 2009, p. 91). TPACK provides a framework for interweaving technological, pedagogical and content knowledge to effectively integrate technology into teaching (Koehler & Mishra, 2009; Chai, Koh, & Tsai, 2013). The following sections describe each domain of teacher knowledge, as well as the interactions between them.

**Content knowledge.** Content knowledge refers to the subject matter taught in school and includes not only the concepts students should learn, but also the models that represent those concepts, and an understanding of why that knowledge is
important (Cox & Graham, 2009; Shulman, 1986). Teachers’ knowledge about a subject matter is built through teacher education programs, professional development, and curricular resources.

A strong understanding of content is essential for effective teaching. For example, McCutchen, Green, Abbot and Sanders (2009) studied the content knowledge of 30 teachers participating in a 10-day institute on phonology and phonemic awareness. Teacher knowledge of phonemic awareness, morphemes, syllables, and a brief history of spelling in the English language were assessed before and after the institute. Not surprisingly, through the course of the institute, teachers’ linguistic knowledge increased. Additionally, teachers’ increased content knowledge transferred to student learning. McCutchen et al. (2009) found that struggling students who were instructed by a teacher with higher linguistic knowledge significantly outperformed other low-performing students who had less knowledgeable teachers. This is one example of how teachers’ content knowledge can influence student achievement.

Though content knowledge is important for learning, teachers do not always demonstrate a deep understanding of their subject matter. In a study of 722 Kindergarten through third grade teachers, Cunningham, Perry, Stanovich, and Stanovich, (2004) evaluated the competency of teachers in the areas of children’s literature, phonological awareness, and phonics. Additionally, they were interested in the calibration of teachers’ knowledge. The authors describe calibration as a teachers’ ability to articulate what they know and where they have knowledge gaps. In the
study, knowledge of children’s literature was assessed through a title recognition test. Teachers were then asked to count the number of phonemes in a word to assess their phonemic awareness. Phonics skills were evaluated by asking teachers to identify irregular spelling patterns in words and answer questions regarding the structure of the English language. They found that participating teachers were not very knowledgeable about children’s literature, phonemic awareness or phonics. Only 10% of teachers knew half or more of the children’s books on the assessment, 30% were able to count half or more of the phonemes in words correctly, and 60% of the teachers could identify half or more of the irregular spelling patterns. Cunningham et. al (2004) point out that the results were especially concerning because teachers may not understand which words should be taught as sight words and which students should be taught to decode. In sum, a teacher’s lack of content knowledge could lead to student misconceptions (Koehler & Mishra, 2009).

While content knowledge is important, Cunningham et. al (2004) argue that it is also important for teachers to have an awareness of the strengths and deficits in their content knowledge. During the calibration assessment in the study described above, teachers were asked to rank their knowledge in children’s literature, phonemic awareness, and phonics as no experience, minimal, proficient, or expert. The results showed that teachers’ knowledge was not well-calibrated. Particularly in the areas of phonemic awareness and phonics, teachers tended to rate themselves as much more knowledgeable than their assessments demonstrated. Cunningham et. al (2004) expressed concern that teachers’ lack of awareness could present challenges for
professional learning. If there are no perceived deficits, it could make building on areas of knowledge difficult.

**Pedagogical knowledge.** Pedagogical knowledge is the “deep knowledge about the processes and practices or methods of teaching and learning” (Koehler & Mishra, 2009, p. 64). This body of knowledge involves an understanding of educational theories surrounding how students learn (Koehler & Mishra, 2009; Chai, Koh, Tsai, 2013). Teachers utilize their pedagogical knowledge when they plan elements of their lesson such as which learning activities to choose, classroom management techniques, grouping of students, and assessment (Koehler & Mishra, 2009). For example, understanding the elements of a cooperative learning task or strategies for engaging students, without consideration of the content, demonstrates pedagogical knowledge (Cox & Graham, 2009).

In practice, teachers often attach content to their pedagogical strategies, making the impact of generic pedagogical knowledge difficult to appreciate. In 2016, Konig and Pflanzl completed a study of 246 Austrian in-service teachers in order to investigate the need for teachers’ general pedagogical knowledge - the knowledge needed for tasks such as preparing and evaluating lessons, motivating and managing students, adapting to the needs of a heterogeneous group of students, and assessing student learning. These areas were measured through a written general pedagogical knowledge portion of the Teacher Education and Development Study – Mathematics (TEDS-M). This assessment measured teachers’ understanding of pedagogical knowledge and their ability to generate solutions to proposed pedagogical problems.
Additionally, each teacher asked one class to complete a student survey evaluating the teachers’ instructional quality. A total of 877 students were surveyed. Konig and Pflanzl (2016) found that there was a positive correlation between teachers’ general pedagogical knowledge and students’ ratings of their teaching methods, classroom management, and teacher-student relationships. In fact, the results showed that general pedagogical knowledge was a stronger predictor of higher student ratings than other characteristics such as teacher personality. The authors argued that while pedagogical knowledge is often built in conjunction with content knowledge, general pedagogical knowledge is also essential given its impact on instructional quality.

**Technological knowledge.** Technological knowledge refers to the skills needed to operate technology (Cox & Graham, 2009). Yet, an understanding of what constitutes “technology” is not always agreed upon. Mishra and Koehler (2006) refer to technological knowledge as an understanding of both standard technologies and advanced technologies (p. 1027). Standard technologies are items most would not consider technology today - books, chalk, and blackboards - while advanced technologies include the internet and other digital tools.

Since virtually all teaching involves a type of tool on this spectrum, others believe technological knowledge should only encompass more advanced technologies and not those that have become commonplace for instruction. For example, Cox and Graham’s (2009) place more of an emphasis on the idea of “emerging technology” (p. 163). These technologies are typically digital and they have recently been introduced
into the classroom (Graham, 2011). The idea of “emerging technology” keeps the area of technological knowledge constantly in flux.

Technological knowledge changes frequently (Harris, Mishra, & Koehler, 2009; Koehler & Mishra, 2009). Unlike past technologies, such as pencils and chalkboards, newer digital technologies are frequently evolving and can often be used for more than one purpose (Koehler & Mishra, 2009). Therefore, instead of thinking of technological knowledge as only computer literacy, Koehler and Mishra (2009) suggested teachers think about technological knowledge as a body of developing knowledge as technology changes.

Many teachers do not see their own technological knowledge as a significant barrier for technology integration. In a 2013 Pew Research Center survey (Purcell, Heaps, Buchanan, & Friedrich, 2013) of middle school and high school teachers, 48% of teachers reported that their own lack of knowledge or training with digital technologies was not a challenge for incorporating digital technologies. Only 9% of teachers surveyed named this as a major challenge. Though technology is frequently changing, teachers who participated in this study were often unaffected by this challenge. Of the teachers surveyed, 39% reported they felt at least “somewhat confident” and 56% felt “very confident” in learning new digital tools as they became available.

Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012), also investigated teacher barriers to technology integration. This multi-case study involved twelve K-12 teachers who were noted as highly skilled, award-winning, users of
technology. External and internal factors were considered as teachers rated how significantly a barrier impacted their students using technology on a scale from 1 – 5 (1 representing not at all a barrier and 5 representing very much a barrier). For the participants, some of the highest-ranking barriers impacting technology use were external – technology support, money, time, etc. Almost all external barriers averaged less than a three. Perhaps since these teachers were recognized for their technology use, they did not rate any of those barriers as particularly impactful.

Similar to teachers in the Pew Research Study (Purcell, Heaps, Buchanan, & Friedrich, 2013), Ertmer and Ottenbreit-Leftwich (2012) showed that internal factors, such as the teachers’ own knowledge and attitudes were ranked very low as a perceived barrier to technology integration in their schools. Personal knowledge and skills scored an average of 1.42 and personal attitudes and beliefs about technology was ranked as the least impactful barrier with an average rating of 1. This is unsurprising as the teachers surveyed were chosen for their expertise in technology integration. Interestingly, participating teachers ranked their colleagues’ beliefs and attitudes as the most impactful perceived barrier, with an average rating of 3.17. In interviews, nine of the twelve participants mentioned other teachers’ attitudes, knowledge, and beliefs as a leading barrier to technology integration throughout their school. Teachers described their peers as intimidated by technology or viewing technology as time consuming to learn. In contrast, the 12 teachers who were highly-skilled in technology use reported that their attitudes, knowledge, and beliefs about
technology actually facilitated their ability to integrate technology into their instruction.

The authors suggest that while external barriers continue to exist, internal factors may be more influential in a teachers’ decision to integrate technology. Therefore, for some teachers, increasing their technological knowledge has the potential to change their attitudes and beliefs, allowing them to become a facilitating factor instead of a barrier to technology integration. It is important to note that there are some limitations to Ertmer and Ottenbreit-Leftwich’s (2012) study. This study did not ask teachers who were not using technology, or using technology minimally, to indicate the barriers keeping them from doing so. The idea that other teachers did not have the attitudes or beliefs to facilitate technology integration was a perceived barrier by their highly-skilled peers. Additionally, the study was limited to twelve participants and therefore the results are not generalizable. Finally, the technological knowledge possessed by the twelve participants was self-reported. As noted with content knowledge by Cunningham et al. (2004), teachers are not always reliable in calibrating their perceived knowledge and their actual knowledge. Without observations of practice, it is difficult to say that the teachers did not over-estimate their abilities.

In a 2011 study of literacy teachers, Hutchison and Reinking found that teachers’ biggest road blocks in integrating technology included not enough time to integrate ICT into lessons or to teach basic computer skills. The authors suggest that listing these barriers could reveal how teachers consider technology-based activities to
be a separate or additional activity as opposed to woven together with curriculum.

The interactions between technological, pedagogical, and content knowledge is a key factor in understanding how technology works with curriculum as opposed to a separate skill.

**Interactions between knowledge domains.** The TPACK framework does not reflect teachers’ content, pedagogical, and technological knowledge as separate elements, but as the synergy between them. These bodies of knowledge are known as pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK) (Mishra & Koehler, 2006).

**Pedagogical content knowledge.** While pedagogical knowledge refers to strategies for learning regardless of content, in actuality pedagogical knowledge is often combined with content knowledge. Teachers use their knowledge about pedagogy in order to teach content (Cox & Graham, 2009). The intersection of these two bodies of knowledge is referred to as pedagogical content knowledge (PCK). Educators practice an understanding of PCK when they choose the best practices for teaching a specific topic (Shulman, 1986). This includes an understanding of how to view the topic in different ways, manage misconceptions students may have, and connect with students’ background knowledge (Mishra & Koehler, 2006; Koehler & Mishra, 2009). For example, a teacher preparing a phonemic awareness lesson considers not only the skill of separating words into individual sounds, but also the activity used to develop that knowledge – such as
Elkonin boxes. As teachers prepare for instruction, they use their pedagogical content knowledge to choose the most powerful strategy or representation for helping students access the content (Cox & Graham, 2009).

**Technological content knowledge.** Technological content knowledge is an understanding of how to use technology to best represent the subject matter (Koehler & Mishra, 2009; Cox & Graham, 2009). This body of knowledge does not take pedagogy into consideration – only the way in which technology affects the content and vice versa (Chai, Koh, & Tsai, 2013). For example, one might consider how a math concept could be represented for students using technology, but not how it will be taught. Since technology is rapidly changing, the way in which teachers can make content accessible is rapidly changing as well (Mishra & Koehler, 2006).

When utilizing their TCK, teachers are aware of how technology-infused representations affect the content they would like students to learn (Koehler & Mishra, 2009). Part of this knowledge includes developing an attentiveness to the affordances and limitations of different technologies. Professional learning in this area could be helpful in developing teachers’ TCK. Explicit teaching of affordances in digital tools such as iPad apps can help teachers choose the tool that best matches their instructional goal and represents the content for students.

**Technological pedagogical knowledge.** Much like how pedagogical knowledge considers learning activities independent from the content, technological pedagogical knowledge does not consider the content to be taught – only technology-based learning activities that can be used across content areas (Cox & Graham,
Examples of this are technologies that have the ability to support collaborative learning, such as blogs (Cox & Graham, 2009; Chai, Koh, & Tsai, 2013). Many iPad apps, such as Padlet or Seesaw, have cross-curricular possibilities. An understanding of apps where teachers acknowledge the pedagogical potential – independent of content – is an example of technological pedagogical knowledge.

**Technological pedagogical content knowledge.** Technological pedagogical content knowledge is the idea that “teaching and learning can change when particular technologies are introduced” (Koehler & Mishra, 2009, p.651). TPACK is not simply an understanding of each individual body of knowledge, but instead a deep understanding of how technology, pedagogy, and content interact with each other (Koehler & Mishra, 2009) as illustrated in Figure B1. In this body of knowledge, teachers evaluate affordances and limitations of different technologies to discover what technology would best support their students’ learning.

When a teacher utilizes TPACK to integrate technology, it is not only about having separate knowledge about the technology, pedagogy, and content for that lesson – but instead about how to draw upon all three domains simultaneously and have the flexibility to make choices that support student learning with technology (Niess, 2011). For instance, a teacher could use technology to help students produce a demonstration of their learning (Grandgenett, Harris, & Hofer, 2011). A math teacher having students use the iPad app PicCollage to organize and demonstrate their knowledge of 3-D shapes through photographs of real-world objects is an example of utilizing technological pedagogical content knowledge. An understanding of the
intersection between all three bodies of knowledge is necessary for effective instruction with technology (Koehler & Mishra, 2009).

Figure B1. Technological Pedagogical Content Knowledge Framework.  
(www.tpack.org)

Acquiring TPACK often takes time, instruction, and practice. Neiss (2011) designated five levels that describe teachers’ acquisition of TPACK over time. This is described as a learning progression. Though, not all educators will spend time in each state of acquisition. The levels include recognizing, accepting, adapting, exploring, and advancing. Teachers at the recognizing stage use technology and see where technology aligns with content, but do not actively integrate technology into instruction. As they move into the accepting stage, teachers develop their beliefs about teaching with technology. Adapting refers to the decision to engage in activities that open themselves up to a possibility of technology integration. In the exploring stage,
teachers are using technology for the teaching and learning of specific content. Finally, teachers in the advancing stage reflect upon their decisions to use technology and use that reflection to guide continued redesigning of lessons.

In a 2017 longitudinal study, Mouza, Nandakumar, Ozden and Karchmer-Klein examined the trajectory of TPACK development in 120 preservice teachers. Using similar descriptors as Niess (2011), Mouza et al. evaluated TPACK development through online surveys, blog entries, and case reports over the course of four years. Students involved in the study enrolled in two technology-based courses. One course, taken during freshman year, taught students technology-based learning tools and highlighted ways in which the tools could be applied to teaching and learning. The second course in the study took place during junior or senior year and focused in the integration of technology. The second course ran alongside a field placement and additional teaching methods courses.

Survey data were collected at the beginning and end of each course, blog entry data were collected during the first course, and case report data were collected during the second course. Blog entries from students’ first course showed that beginning preservice teachers are often at the recognizing and accepting levels of TPACK development. During the second course, preservice teachers learned more about how to integrate technology and were given opportunities for practice through their field experience. Their growth in TPACK development was evident in their submitted case reports. Each case report mentioned a deeper understanding of TPACK, with 25 cases using examples of exploring and 15 cases showing evidence of adapting. These data
help to explain how teacher education can affect the development of knowledge surrounding technology integration. As the preservice teachers learned more about how to integrate technology and practiced with students, they were able to cite examples of adapting (engaging in opportunities during instruction for technology use) and exploring (using technology for teaching and learning). In analyzing the survey data, Mouza et al. (2017) found that overall growth in TPACK development had occurred throughout the four years of the program and between the start and finish of each course. There was a decline in TCK, TPK, and TPACK development between the completion of the first course and the beginning of the second 2-3 years later. The authors suggest that a focus on PK and CK during the years coupled with a lack of opportunities to develop and practice their newly learned technology knowledge, could be a cause of this decline. While this research does not represent the TPACK development of in-service teachers, it is important to note the importance of both instruction and opportunities for practice highlighted in this study.

Effective technology integration is far more than a knowledge of technology tools and an understanding of how they work (Koehler & Mishra, 2009). It is also much more complex than having strong technological knowledge, content knowledge, and pedagogical knowledge separately. Instead, in order to use the TPACK framework to design curriculum, teachers must consider the choices made with regards to technology and how the technology can impact the content or how it will be taught and vice versa. Hutchison, Beschorner, and Schmidt-Crawford (2012) feature these decisions in their observations of a fourth-grade teacher integrating iPad apps
into literacy instruction. The teacher first identified that her learning goal was to teach sequencing as reading comprehension strategy. She wanted students to work in small groups to read an article, record the main events, and sequence them using time order words. She chose to use the technology tool Popplet to have students record their ideas. The affordances of this tool allowed for students to organize their ideas in a way that made sense to them and using as many boxes as they saw fit – something that would not be possible with a traditional worksheet. Using the app also allowed for students to include images to support their learning and easily save their work. The demonstration of instructional planning within the TPACK framework demonstrates how teachers must use their knowledge of technology, pedagogy, and content but also consider how each domain interacts to provide quality instruction for students. Overall, approaching technology integration from the TPACK framework helps teachers focus their instructional goals, the students, and the curriculum instead of solely on the technology being used (Harris, Mishra, & Koehler, 2009).

The TPACK Framework in Action

Measuring TPACK. In order to effectively integrate technology into instruction, teachers need to not only develop their technological knowledge, but their knowledge of how technology interacts with content and pedagogy (Harris, Mishra, & Koehler, 2009; Koehler & Mishra, 2009). Researchers have developed approaches to assessing TPACK in in-service and pre-service teachers. In fact, Koehler, Mishra, Kareluk, Shin, and Graham (2014) determined that 141 instruments have been designed to measure an understanding of TPACK. These instruments include self-
report surveys, observations, performance assessments, interviews, observations, and open-ended questionnaires. They suggest one reason for this sizeable bank of instruments could be the rapidly changing digital tools used in teaching and learning. As the pace of technology changes, new tools are needed as a method of capturing teachers’ understanding of TPACK (Koehler, Mishra, Kareluik, Shin, & Graham, 2014).

One type of assessment tool for measuring TPACK is a self-report survey. An example of this type of measurement is the Survey of Preservice Teachers’ Knowledge of Teaching and Technology developed by Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009). In the design of this survey, the authors made a conscious effort to move past only measuring technological knowledge and instead measure preservice teachers’ understanding of each body of knowledge within the TPACK framework. The survey was originally tested with 124 undergraduate students who had not yet begun their student teaching. The final version of the survey consisted of 57 5-point Likert Scale items referring to each body of knowledge in the TPACK Framework and three open-ended questions to measure their experience with TPACK in their courses, with cooperating teachers, and in their own instruction.

Following the introduction of surveys in TPACK research, Harris, Grandgenett, and Hofer (2010) began to question the accuracy of the self-reporting of preservice teachers. Specifically, the authors were concerned with the notion that simply because preservice teachers self-reported confidence in their understanding of TPACK on a survey instrument, it did not necessarily mean that they could translate
that into practice. Instead, they proposed an assessment rubric that would measure preservice teachers’ demonstration of TPACK in their lesson planning. The assessment rubric created by Harris et al (2010) was an adaptation of Britten and Cassady’s (2005) earlier Technology Integration Assessment Instrument. The main difference was an effort to measure preservice teachers’ ability to integrate technology and particularly to demonstrate an understanding of TCK, TPK, and TPACK in their lesson planning. The assessment rubric was tested by 15 experienced teachers and teacher educators to assess preservice teachers’ lesson plans. The rubric examines four areas: how well technology choices aligned with curriculum, how well technology choices supported instructional practices, the appropriateness of the technology choices for the content and learning activities, and how well the technology, content, and instructional practices fit together.

After working with the assessment rubric for preservice teachers, Harris, Grandgenett, and Hofer (2012) observed that in-service teachers’ written lesson plans could not be assessed in the same way. They found that experienced teachers often wrote brief lesson plans that do not take into account all of the strategies the teacher intends to employ. Unlike pre-service teachers, experienced teachers did not account for all of their instructional choices in their written plans; but, they could verbalize what they did and why when asked. In a 2012 study, Harris et al utilized the same assessment rubric as their 2010 preservice teacher study (Harris, Grandgenett, & Hofer 2010), but in a different way. This time, instead of evaluating written lesson plans, the rubric was used to evaluate 12 in-service teachers’ instructional planning through
audio-taped interviews. Harris et. al (2012) found that using the rubric in this way could accurately measure teachers’ demonstration of understanding in the areas of TCK, TPK, and TPACK.

Using multiple measurements could be beneficial for gaining an understanding of teachers’ technological pedagogical content knowledge. Each type of assessment offers different insight. Surveys offer a quick reflection of how teachers view their understanding of how teaching and learning is influenced by technology. What surveys cannot accurately represent is what TPACK looks like in practice. Discussions concerning lesson planning, such as the audio-taped interviews used by Harris et. al (2012), give additional insight behind the choices made to use technology to support instructional practices and the appropriateness of those choices. Koehler and Mishra (2009) state that, “TPACK is the basis of effective teaching with technology” (p. 66). Then, in order to develop teachers’ TPACK, it is important to know to what extent teachers are already utilizing this knowledge.

Developing TPACK. Several approaches to developing TPACK have been discussed throughout research. One approach begins with pedagogical content knowledge as a pathway to developing TPACK. In this approach, technology is introduced as a support to the pedagogical content knowledge that teachers already possess. Another approach addresses the development of pedagogical content knowledge and TPACK simultaneously.

PCK to TPACK. Harris and Hofer (2009) propose a way for in-service teachers to begin with their pedagogical content knowledge as they build their
technological, pedagogical, content knowledge. This is a helpful strategy for experienced teachers as they already have years of instructional strategies to pull from and build upon (Koehler et. al, 2014). In this model, educators begin with their instructional goal, followed by choosing instructional strategies, activity types, and assessment. Teachers choose the digital tool last. By leaving the choice of the digital tool as the last step, it puts the focus on the students and the learning as opposed to the technology (Harris & Hofer, 2009).

Harris and Hofer (2011) examine this model of TPACK development further in a small study of seven middle and high school teachers participating in a five-month professional development course on learning activity types and instructional planning. Following completion of the course, teachers expressed the importance of thoughtfully using technology, as opposed to just using it as a required teaching tool. Participants discussed how they had learned to focus on learning activities and then choose technological tools to support and enhance learning. The appealing part of this model is that this process of developing TPACK is closely aligned to how teachers plan lessons in which they do not integrate technology. Instead of viewing technology integration as an entirely new piece of information, it is instead a piece of the puzzle after identifying instructional goals and learning activities.

Hutchison, Beschorner, and Schmidt-Crawford (2012) explored the use of Harris & Hofer’s recommendations. The purpose of this exploratory study was to understand how iPads supported instruction in a 4th grade classroom. For the duration of the study, each lesson was built with the curricular goal first, followed by
pedagogical decisions and activity choices. The last step in the planning process was to choose iPad apps that would help students best meet the learning goals. In choosing the learning goal and instructional approach first, researchers were able to see how the digital tool contributed to instruction. In many cases using the iPad exposed students to additional digital literacy skills such as the importance of size and placement of text, navigating digital text, and selecting digital drawing tools that best convey meaning (Hutchison, Beschorner, & Schmidt-Crawford, 2012). They found that through using the recommendations laid out by Harris and Hofer (2009) the teacher was able to achieve full “curricular integration” (p.17) where teachers are demonstrating an understanding that technology is essential to instruction as opposed to a separate skill.

Hutchison and Woodward (2013)’s digital planning cycle extends Harris and Hofer’s (2009) design and also helps develop TPACK by building upon teachers’ pedagogical content knowledge. While the planning cycle is directed at literacy-based lessons, it is conceivable that teachers could adapt these steps to be used across different content areas. In addition to a need for assistance in implementing the TPACK framework, Hutchison & Woodward (2013) found that teachers often had a lack of understanding surrounding the affordances and constraints of different digital tools. Focusing on technology without consideration for how it can help achieve learning goals could be detrimental to developing students’ content knowledge. They set out to create a planning cycle which is represented in Figure B2. They propose that teachers could use the cycle to help create technology-integrated lessons that were
not driven by the technology, but instead used digital tools to help accomplish the instructional goal.

![Technology Integration Planning Cycle](image)

*Figure B2. Technology Integration Planning Cycle. (Hutchison & Woodward, 2013)*

The planning cycle (Hutchison & Woodward, 2013) begins with choosing a learning goal and determining the best instructional approach for accomplishing that goal. Only after those two have been established do they suggest teachers look into what digital tool best addresses their learning goal and instructional approach. Unlike Harris and Hofer (2009), this planning cycle suggests that teachers should reflect at this point and decide whether or not a digital tool is appropriate for accomplishing their goals. If it is not, they should exit the planning cycle and go forward using a non-digital tool. If teachers decide to use a digital tool, Hutchinson and Woodward (2013) suggest that it is incredibly important to take time to critically evaluate the
tool’s affordances and constraints. This can help teachers “create opportunities for both enhancing existing learning activity types and creating new ones” (Harris, Mishra, & Koehler, 2009, p. 406). In leveraging the affordances of a digital tool, teachers can help students engage in learning of the content as well as learning digital literacy skills. At times, the constraints of a digital tool can overpower the instructional goal, or the digital tool may not offer as many contributions to the lesson as originally thought. For example, if a teacher has chosen an app that is very time consuming to learn, and is only being used for one lesson, the teacher will need to truly evaluate that choice. Either another digital tool could be used in its place, or the teacher could add elements of scaffolding to take the emphasis off of the technology and place it back on the instructional goal. If after evaluating the digital tool, the teacher decides it is not a good match for the instructional goal or approach, then the authors once again suggest teachers exit the planning cycle. The value of this planning cycle lies in the importance of simultaneously using all aspects of teacher knowledge in the TPACK framework. This is why Hutchison and Woodward (2014) urge teachers to go back to the instructional goal after the lesson has been planned to assure that the content, pedagogy, and technology are all working together to support student learning. A planning cycle situated in frequent reflection is essential in considering all of the elements of quality technology integration (Hutchinson & Woodward, 2013).

In 2016, Hutchison and Colwell evaluated the use of this planning cycle by preservice teachers integrating iPads into instruction. During a literacy methods
course, 48 preservice teachers were taught the instructional planning cycle introduced by Hutchison and Woodward (2013). In pairs, preservice teachers created lesson plans by going through each step in the planning cycle. As they planned, participants kept notes on their decisions. They taught the lesson to students in their field placements and reflected on the experience from planning to execution. An analysis of lesson plans, presentations, and reflections showed that preservice teachers struggled to follow the structure of the instructional planning cycle due in part to lack of teaching expertise. This was evidenced by preservice teachers’ difficulty in developing a lesson that integrated technology when the technology did not help meet the learning goal. Instead of researching additional resources such as websites or technology experts, preservice teachers changed their instructional goal based on the technology they wanted to use. The authors found that pre-service teachers struggled more than previous in-service teachers with the planning cycle since in-service teachers must keep their instructional goals at the forefront of their lesson planning and cannot easily change them for the sole purpose of incorporating technology. The authors provided questions at the conclusion of the study such as: “What particular features of the app are valuable in helping meet your instructional goal?” or “What special considerations for your lesson need to be taken into account because of the way that you are integrating iPads into your instruction?” (Hutchison & Colwell, 2016, p. 15). Addressing these questions could help to further clarify each step in the cycle.

Each of the approaches described above allows teachers to develop TPACK through the process of lesson design that begins with content and pedagogy in
mind. In doing so, teachers are not basing their lessons on the technology available, but instead on the learning goal and content. Teachers develop TPACK as they simultaneously draw on all three domains of knowledge and assess the capability of the content, pedagogy, and technology to interact with each other in a way that supports student learning. A big difference in these approaches comes with the introduction of the planning cycle (Hutchison & Woodward, 2013) and “exit” allowing teachers to opt out of using a digital tool if it was not a good match for the pedagogy and/or content.

**Developing PCK and TPACK simultaneously.** Mishra and Koehler (2006) address Learning by Design as one method of developing teachers’ understanding of TPACK. In this method, pedagogical content knowledge and TPACK are developed simultaneously. Learning by design is described as a method of “learning by doing” (Mishra & Koehler, 2006, p. 1035). Within this model, educators are collaboratively solving authentic instructional problems using technology. Instructors become facilitators of learning as opposed to only sharing technological knowledge with teachers.

In 2013, Mouza, Karchmer-Klein, Nandakumar, Ozden, and Hu investigated an integrated approach to TPACK development, which combined methods courses and field experience with a course on integrating technology. This allowed for the 88 participants to develop their PCK and TPACK simultaneously. At the beginning of the Integrating Technology course, pre-service teachers self-assessed their understanding of TPACK and each body of knowledge in the framework through the
TPACK survey developed by Schmidt et. al (2009). Throughout the course, students learned about various technology resources and how they can be used for teaching and learning. Alongside the technology course, students participated in methods courses which required them to design and reflect upon technology-integrated lessons taught during their field placements. The reflections in their case reports were used as a data source.

At the conclusion of the course, the survey showed significant improvements in all areas of the TPACK framework. Open-ended responses showed improvements to pre-service teachers’ understanding of TPACK in their ability to describe their ability to effectively utilize a combination of content, pedagogical, and technological knowledge. Prior to the course, more than half the students mentioned they had no opportunities to gain this knowledge through personal experience. The integrated approach allowed students to teach a lesson and reflect upon their ability to apply their knowledge of TPACK to their instruction. Students’ application of TPACK was also evident in their reflections. Though the level to which students demonstrated TPACK development varied, all case reports showed evidence of TPACK.

The way in which TPACK is developed may differ between in-service teachers and pre-service teachers. The PCK to TPACK route, where teachers build upon their pedagogical content knowledge as they develop TPACK, was frequently used with in-service teachers. Experienced in-service teachers already have a foundation of pedagogical content knowledge that allows for this method. Approaches such as Harris and Hofer (2009) or Hutchison and Woodward (2013) build on teachers’
strengths of lesson planning to begin to develop TPACK. This approach may not work for preservice teachers, as evidenced by Hutchison and Colwell’s (2016) study in which participants had difficulty following the structure of the planning cycle. In contrast, developing PCK and TPACK simultaneously, appears to be a method conducted frequently with pre-service teachers. This model is seen in integrated approaches where methods courses, technology integration courses, and field experiences occur simultaneously to build TPACK. This is logical as pre-service teachers must develop all bodies of teacher knowledge during their teacher education programs. Understanding different approaches to developing TPACK is an important aspect of planning professional learning opportunities for teachers.

**Professional Learning**

*The need for professional learning.* The TPACK framework emphasizes that knowing how to operate technology cannot be mistaken for the ability to successfully integrate technology in the classroom (Morsink et al, 2010). In other words, technological knowledge does not automatically lead to an understanding of how technology can best be used to support and transform teaching and learning. Instead, Ertmer and Ottenbreit-Leftwich (2010) suggest that teachers’ mindsets must change in order to begin effectively integrating technology. They propose that professional learning is needed to help teachers make changes in four areas surrounding technology: knowledge, pedagogy, self-efficacy, and culture. Growing this self-efficacy requires teachers to work with knowledgeable peers and participate in professional learning that is relevant to their context and immediate needs (Ertmer &
Ottenbreit-Leftwich, 2010). Additionally, the authors comment that including technology in professional learning plans positively influences the school culture surrounding technology. This is another important dimension in affecting change.

In a multi-case study of 12 teachers highly-skilled at integrating technology, Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur and Sendurur (2012) found that teachers’ beliefs about the use of technology were the biggest factor in their decision to use technology. Even when external barriers, such as inadequate access to technology, were present, teachers’ strong positive beliefs towards technology integration allowed them to utilize technology in meaningful ways anyway. Due to this factor, Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) suggest that improving teachers’ technology skills and changing their pedagogical beliefs about technology in the classroom may be more beneficial than reducing the ratio of students to devices. They encourage continuous and collaborative professional development to help obtain this goal.

The importance of professional learning that guides teacher’s understanding of technology integration is mentioned by several national organizations. Many make comments on budget concerns and how funding should be set aside to provide such professional learning. The International Reading Association (2009) called for administrators to devote 30% of their technology budget to developing teacher knowledge. The NCTM statement (2017) shares that continual development is needed to support teachers in their ability to strategically choose technology for education. The NMC K-12 Horizon Report (Johnson, Adams Becker, Cummons, Estrada,
Freeman, & Ludgate, 2013) also mentions the need for ongoing professional learning as one of the significant challenges of technology adoption. They report that teachers are often given the tools and then are mandated to use them without adequate training of how to do so. When teachers are unsure how to utilize the tools they are given, they are often tossed aside and used infrequently or are used inappropriately in a way that does not increase student achievement or engagement.

The ultimate effectiveness of technology depends on much more than just choosing a program or device. It is important for educators to remember that “there is no magic in the machine” (Cheung & Slavin, 2013, p. 297) when it comes to technology. The technology, content, pedagogical strategies, and instructional goals all play key roles in successful integration. Student achievement does not come from the technology itself but through teacher’s abilities to make decisions about technology that lead to quality instruction (Lawless & Pellegrino, 2007). Making decisions about integrating technology requires an understanding of the interactions between technological, content, and pedagogical knowledge. Professional learning can help build these knowledge bases as well as provide opportunities to improve teachers’ attitudes towards technology integration.

**Organization of professional development.** Lawless and Pellegrino (2007) describe three types of professional development found in research: one-shot workshops, design-based approaches, and mentoring/coaching models. One-shot workshops are one-time opportunities. This type of professional learning takes place in one session. The length of the session can vary between a one-hour meeting or a
day-long training. It is a “sit and get” professional development session where the participants typically listen to a presentation from an expert. Often, one-shot technology professional development sessions focus on building technological knowledge. The lack of connections to specific content or pedagogy in these types of sessions can lead to a disconnect between teacher learning and actual application of skills (Lawless & Pellegrino, 2007).

The design-based approach relieves some of the disconnect felt in one-shot workshops. In the design-based approach, teachers are not only learning about technology, but how it can be used in their specific context. When teachers develop their technology skills within the context of their own classroom context, they are encouraged to begin thinking of technology as essential as opposed to supplementary (Ertmer & Ottenbreit-Leftwich, 2010).

Introducing Harris and Hofer’s (2009) “grounded approach to technology integration” (p. 23) to teachers is an example of the design-based approach to learning about technology integration. In this approach, teachers begin by identifying the learning goal and making pedagogical decisions. After this step is complete, teachers begin to match technology-based activity types to their instruction. The authors have created an online guide of activities for teachers in the form of a Learning Activity Types Wiki (2011). In 2011, Harris and Hofer published a study concerning professional learning of technology integration grounded in these curriculum-based activity types. This small-scale study followed the TPACK development of 7 social studies teachers. The teachers participated in professional learning sessions where
they were shown how to utilize activity types to help integrate technology. They were explicitly taught what instructional possibilities exist with technology and how to best leverage the technology to meet their learning goal. The learning of technology was grounded in the context of their content. At the conclusion of the study, the teachers articulated a change in how they viewed technology in relationship to instruction. Instead of using technology for its own sake, teachers were actively considering the best matches for their chosen activity types. While teachers did not find that technology had transformed their teaching, they did feel that using technology enhanced their activities to make them more effective. This design-based approach allowed for teachers to develop their TPACK alongside their instructional strategies specific to their context.

A third approach to professional development is a mentoring or coaching model. These have the ability to provide more specialized and individually-tailored professional learning environments (Lawless & Pellegrino, 2007). Learning can be tailored to help integrate technology with specific content and pedagogical knowledge. Professional learning should permit teachers to focus on immediate needs, participate in successful personal experiences, work with knowledgeable peers, and provide adequate time to develop new knowledge (Ertmer & Ottenbreit-Leftwich, 2010). The mentoring and coaching models allows time for each of these elements.

The coaching model was used in Morsink et al.’s (2010) in a study of 13 fifth and sixth grade teachers. Over the course of seven months, teachers worked on self-chosen projects and participated in professional development. In addition to two
summer institute meetings, participants in the study were paired with researchers to act as mentors and provide individualized support with a teacher’s self-chosen project. Teachers were given an overview of the TPACK framework and then met with their mentor to create a plan and develop their project. Teachers completed three online surveys. One before the start of the summer institute, one at the conclusion of the second summer institute meeting, and one after they had completed and implemented their project. These data from the surveys showed that teacher’s general knowledge of technology, along with their knowledge of technology integration, had increased after participation in the seven months of professional development. Data suggested that as a result of their professional learning, teachers placed a higher priority on technology integration.

**Long-term effects of professional development.** In a longitudinal multiple case study of 7 teachers, Mouza (2009) investigated long-term effects of research-based professional development on teacher learning. The teachers engaged in professional development designed by the Institute for Learning Technologies. The opportunity was made possible by the Eiffel Project which was an effort to bring technology into K-12 classrooms. The professional development took place over the course of one year and had several elements: building technological knowledge, designing activities aligned to classroom practice, school-based support, and opportunities for feedback and reflection. The 2009 study took place two years after the completion of the professional development program. Teachers were interviewed,
surveyed, and observed to determine the sustainability and growth of their learning over time.

Data showed that teachers were able to sustain their technological knowledge as well as their ability to use technology instructionally. While not all teachers were able to advance their technology integration skills, all were able to maintain their increased awareness of how technology can be used in the classroom. Mouza (2009) proposes that this sustainability comes from the teachers’ “cyclical change process” (p. 1228). As teachers engaged in professional development, they made changes to their knowledge and practice. The professional development required teachers to create activities aligned to their classroom practice and encouraged reflection. As they experimented and reflected on these new practices, they were able to witness growth in themselves and their students which in turn influenced their beliefs about technology. As their beliefs changed, they were inspired to pursue more changes in their knowledge and practice.

These opportunities for cyclical practice and reflection can help change what Mouza (2009) calls a “critical variable” in effective use of technology – beliefs about the characteristics of your students. She argues that how teachers envision technology helps or hinders a teacher’s ability to use it effectively. Teachers who believe that technology can help meet students’ individual needs will likely be more successful than those who believes their students are unable to use technology or do not value technology integration.
Morsink et. al (2010) stated that, “developing expertise in technology integration is a time-consuming, long-term process that requires commitment and ongoing effort from teachers” (p. 14). Approaches to professional learning such as design-based or coaching provide teachers with adequate time to learn and apply new skills. Allowing opportunities for reflection on learning, practice, and student outcomes can encourage a cyclical change process where teachers maintain their knowledge and have opportunities to grow. Design-based and coaching approaches also allow teachers to make small changes in their own context over time, which can be very powerful in creating change (Ertmer & Ottenbreit-Leftwich, 2010).

**Conclusion**

Access to devices and the internet has continued to rise over time (U.S. Department of Education, Office of Educational Technology, 2016). Thus, new domains of knowledge are necessary to teach effectively using technology. Instead of simply developing technological knowledge, teaching with technology requires an understanding of the ways content knowledge, pedagogical knowledge, and technological knowledge interact with each other (Koehler & Mishra, 2009; Niess, 2009). This is what is described in the TPACK framework. Developing TPACK does not only involve learning technological skills, but also an understanding of how the affordances and constraints of different technology can impact content and pedagogy.

Professional learning is an important element to bringing technology integration into the classroom (IRA, 2009; NCTM, 2017; Johnson et. al., 2013). For the purposes of my ELP, I plan to provide professional learning opportunities to
develop teachers’ TPACK – not only their technological knowledge. One way research shows to develop teachers’ TPACK is to build upon their well-established PCK (Koehler & Mishra, 2009). The technology integration planning cycle developed by Hutchison and Woodward (2013) is a step-by-step process for teachers to begin integrating technology. This model allows teachers to start with their instructional goal and utilize the affordances of the digital tools to support or extend the instructional goal. Most importantly, this cycle has an exit point. If the digital tool is not a good fit, teachers can exit the planning process. With this, teachers are not pressured to fit a digital tool where it does not support student learning. Opportunities for practice and reflection on learning and student outcomes must also be included in any professional learning created for my ELP. When teachers are able to learn, practice, and reflect on the results, they can continue to refine their beliefs and sustain what was learned about technology integration over time (Mouza, 2009).
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new literacies emerging from the Internet and other information and

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framework for teacher knowledge. *Teachers College Record, 108*(6), 1017.

Morsink, P. M., Hagerman, M. S., Heintz, A., Boyer, D. M., Harris, R.,
TPACK technology integration: The initial learning trajectories of thirteen

Mouza, C. (2009). Does research-based professional development make a difference?
A longitudinal investigation of teacher learning in technology


Appendix C

TEACHER SURVEY

I administered the School Technology Needs Assessment (STNA) to teachers at Center Elementary School (CES). This survey is available through the William and Ida Friday Institute for Educational Innovation of North Carolina State University’s College of Education (SERVE Center, 2007). The STNA was developed as a tool for school decision-makers to collect data in an effort to improve the use of technology in teaching and learning. The tool surveys teachers’ evaluation of their school environment for technology integration, available professional development resources, teacher and student technology use, and their views of technology’s impact on both students and teachers.

The purpose of surveying teachers for this ELP was two-fold. First, it allowed me to collect data directly from the teachers about their understanding of technology use in their particular professional context, and report on areas related to the school’s vision for technology integration, accessibility of technology resources, and current technology-based instructional practices. Secondly, since one of my ELP goals was to design online professional development modules that guides teachers on how to effectively integrate technology into different content areas, the survey provided important insights on focus areas. Overall, the survey results can be used in
combination with the other ELP artifacts to inform school-based policy decisions and help advance the use of technology in learning at CES.

Method

Participants

All teachers in grades 1 through 5 (N=30) at CES, as well as those who taught music, art, physical education, technology, and Spanish (N=5) were invited to participate in the survey. In all, 13 teachers out of 35 possible participants completed the survey, a participation rate of 33%. Every grade level was represented by at least one survey response. The breakdown of survey responses is shown in Table C1.

Table C1
Survey Responses by Grade Level

<table>
<thead>
<tr>
<th>Grade</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>3</td>
</tr>
<tr>
<td>Grade 2</td>
<td>3</td>
</tr>
<tr>
<td>Grade 3</td>
<td>1</td>
</tr>
<tr>
<td>Grade 4</td>
<td>1</td>
</tr>
<tr>
<td>Grade 5</td>
<td>2</td>
</tr>
<tr>
<td>Related Arts</td>
<td>3</td>
</tr>
</tbody>
</table>

Survey

I used the School Technology Needs Assessment (STNA). This 87-question survey was adapted, with permission of the William and Ida Friday Institute for Educational Innovation, to include four sections and 77 questions. In an effort to shorten the time teachers needed to complete the survey, I modified the survey by
deleting 12 questions from the questionnaire. I removed 5 questions about the school technology plan, since I was aware that CES did not have one. Since I am also a CES staff member, I removed 7 questions where I already knew the answer. These questions included the presence of at least one computer in each classroom, adequacy of systems for communication (e.g. e-mail, school network, web pages), incentives for innovative use of technology, evaluation of teachers, staffing of our library media specialist, and access to a catalog system for locating teaching materials. I added two questions prior to section one to gather teacher demographic data. Teachers shared the grade level they teach and the devices that are available to use with their students. Section 1 asked teachers to identify their grade level and their access to technology devices. Sections 2, 3 and 5 asked respondents to agree or disagree with statements on supportive environment, professional development, and the impact of technology using a 5-point Likert Scale. The scale also included an “I do not know” choice. Section 4 asked respondents to report the frequency of teacher and student technology use. All 77 questions used in this survey can be found in at the end of this appendix.

**Data Collection and Analysis**

The questions from the adapted STNA survey were uploaded to the Qualitrics website in order to complete the questionnaire digitally and anonymously. All teachers in grades 1 – 5 and teachers of the related arts subjects were e-mailed a link to participate in the survey. The email addresses of those invited to participate were publicly accessible through the school’s website. Out of the 35 teachers invited to partake in the survey, there were 13 respondents.
Teachers were given 16 days to complete the survey. On day 13, an e-mail was sent to the staff with a link and reminder that the survey would close shortly. After the survey closed, I used “Reports: Results” on the Qualtrics website to view the data collected. In this report, I reviewed the number of respondents who chose each option on the Likert Scale. I exported these data into the tables used below. Next, I reviewed the data within the lens of the purpose of my ELP. I looked for patterns in the responses to get a clearer picture of teachers’ context with regards to technology integration. Additionally, I looked at responses to help identify teachers’ technology-related professional development needs.

**Results**

**Supportive Environment**

The first section of the STNA focused on the level of a supportive environment surrounding technology integration. Teachers were asked to respond to questions about school vision, planning and budget, communication, infrastructure, and staff support. Tables C2, C4, C5 and C6 represent the data collected in this portion.

**Vision.** Examining the school vision for Center Elementary School is a component of my ELP. Prior to the spring of 2017, the school’s website read that part of the school’s vision was “all staff members will be provided with in-service training to successfully implement technology into all curricular areas” (Center Elementary School, 2017). This statement has since been removed and replaced with a more general mission and vision highlighting that, “collaboration, communication, critical thinking and creativity will empower students to impact the global society” (Center
Elementary School, 2017). The data in Table C2 represents teachers’ understanding of how the school vision has been communicated and administrative support of technology.

Table C2

Supportive Environment: Vision

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A vision for technology has been developed through an effective collaboration among stakeholders, e.g., administrators, specialists, teachers, students, and community members.</td>
<td>3</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>The vision for technology use has been effectively communicated to the community.</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Administrators model effective uses of technology.</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Administrators support changes in school-level systems, policies, and practices related to technology.</td>
<td>2</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
As a part of my ELP, I interviewed the principal and assistant principal of Center Elementary School. This interview helped me to gain perspective on the current use of technology at CES and the goals and expectations for technology integration in the future from their perspectives. During this interview, both administrators suggested that though the school’s vision does not specifically mention technology, but that it is implied. The results of this survey suggest that this is true. Many of the participants (76.93%) agree that a vision for technology has been developed for the school, even though it is not referenced formally on any school documents. The effectiveness of how this vision has been communicated to the community is a bit more unclear. Responses for this question varied from 53.84% agreeing communication of this vision has been effective, 38.46% believing it has not been effective, and 7.69% communicating a neutral response. This suggests that while teachers believe the school has a vision for technology integration, they may have concerns with how well it has been communicated to other stakeholders in the community, such as parents.

Administrative support stood out as a particularly positive response in this section of the survey. In reflecting upon a supportive environment, almost all participants found administrators to be supportive in changing policies and practices when it comes to technology. This is unsurprising with the change in leadership at CES this year. The current administration has provided all teachers with iPads and has
been open to suggestions for increasing teacher-led professional learning opportunities.

**Planning and budget.** An important document for planning at CES is the School Success Plan. According to the 2016-17 document (CES, 2018), the School Success Plan represents the school’s goals and priorities as dictated by the district’s strategic plan and feedback from the school’s comprehensive school review. Each school’s plan helps inform the district’s consolidated grant which is reviewed by the Department of Education. The district then receives money from the Department of Education to support the goals in the consolidated grant and School Success Plan. The 2016-17 plan outlined a plan to buy 15 teacher iPads and keyboards, research Apple and Google trainings for teachers to attend and have those who attend the sessions train the staff. The 2017-18 plan reflected technology in its mention of communication with families, stating CES will “establish technology-based classroom communication with families, i.e. blogs, Seesaw, websites.” Due to the fact that these resources are free, there is no request for technology funding in this version of the School Success Plan. At the time of this survey, the 2018-19 School Success Plan had not yet been proposed.

Instead, financial support for technology has come from general building budget funds, the school’s PTA, and district funding. Table C3 shows the estimated cost of the devices at the time of this survey, as well as the funding source. Table C4 represents teachers’ understanding of how money is raised and budgeted for technology as well as how that spending is evaluated.
Table C3

*Cost and Funding Sources of Laptops and iPads at Center Elementary School*

<table>
<thead>
<tr>
<th>Device</th>
<th>Grade Level</th>
<th>Estimated Cost</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 iPads</td>
<td>1&lt;sup&gt;st&lt;/sup&gt;</td>
<td>$10,560</td>
<td>Building</td>
</tr>
<tr>
<td>20 iPads</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt;</td>
<td>$10,260</td>
<td>Building</td>
</tr>
<tr>
<td>25 iPads</td>
<td>3&lt;sup&gt;rd&lt;/sup&gt;</td>
<td>$10,825</td>
<td>Building/PTA</td>
</tr>
<tr>
<td>30 Laptops</td>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>$15,690</td>
<td>District</td>
</tr>
<tr>
<td>28 Laptops</td>
<td>Shared</td>
<td>$14,644</td>
<td>PTA</td>
</tr>
<tr>
<td>30 Laptops</td>
<td>Shared</td>
<td>$15,690</td>
<td>PTA</td>
</tr>
</tbody>
</table>

*Note:* All estimated costs of iPads include cases and Apple Care.

Table C4

*Supportive Environment: Planning and Budget*

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The amount of money budgeted for technology resources is sufficient for continuously updating and replacing technology systems as they become outdated.</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Table C4 Continued

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplemental sources of funding are actively pursued to support technology, e.g., external grants, collaboration with community or parent groups, support from businesses.</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Multiple sources of data are used to evaluate the impact of technology initiatives on student outcomes.</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Teachers responded with a range of answers as to whether or not the amount of money budgeted is sufficient for updating systems and how supplemental resources are pursued. This makes it difficult to say that teachers do or do not have a firm grasp on this topic. This is not particularly surprising. With the exception of reviewing the School Success Plan, teachers are not typically involved in the creation of the school’s budget or how funding has been allocated. As a school, CES has continually received additional devices for both students and teachers. Additionally, teachers have typically
received timely updates to software and replacements for broken hardware. This could contribute to an agreement that the budget for resources is sufficient. The roll-out of iPads at each grade level has been consistent, but slow. The school began with one shared cart and slowly moved to iPad carts at each grade level and 1-1 in 4th and 5th grades. At the time of this survey, 1st through 3rd grade each had a shared iPad cart, 4th grade shared a laptop cart, and 5th grade had 1-1 iPads. As a teacher at CES, I have heard my colleagues say that integrating technology is difficult because they “don’t have iPads.” These informal comments show that some teachers view the cart system as insufficient for their instructional needs. The slow roll-out of additional devices could contribute to those disagreeing that the budget for resources is sufficient.

The final question in this subsection asks about evaluating technology initiatives. As the school has increased the number of devices and introduced a 1-1, this question investigates how teachers feel about the evaluation of these initiatives. This question brought about a more negative reaction with more participants (66.54%) disagreeing with the statement than agreeing (23.08%). This indicates that teachers are generally interested in looking for better ways to evaluate the initiatives CES currently has in place.

Communication. Earlier in the survey, teachers responded to questions about how the vision for technology integration was communicated to the community. This subsection asks teachers to share how well technology is used to communicate with the community. At the time of the survey, CES teachers use multiple digital platforms for parent-teacher communication: e-mail, Remind, Seesaw, Edublogs, and
Schoology. Table C5 represents teachers’ beliefs about communication and collaboration using technology.

Table C5

*Supportive Environment: Communication*

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology is used to communicate and collaborate <strong>with families</strong> about school programs and student learning.</td>
<td>5</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Technology is used to communicate and collaborate <strong>with the community</strong> about school programs designed to enhance student learning.</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Unsurprisingly, 100% of participants agreed that technology was used to communicate with families. Since Seesaw, Edublogs, Schoology, and e-mail were required for teachers, it was expected that 100% of teachers would agree with this statement.
In an interview with the principal of CES, she shared that one benefit of technology is to reach beyond the classroom walls. She referenced the district’s slogan, “The World is Our Campus” in saying that technology allows us to receive knowledge and share knowledge in a much different way than traditional instruction; however, the responses about communication with the community did not represent application of this goal. The question drew much more varied responses. While a majority of the participants (61.54%) continued to agree that communication was used in this way, 30.77% took a more neutral position of were simply unsure if this was the case. This could represent different understandings of what is meant by “community,” or perhaps some teachers are using technology in this way and others are not. Either way, the data shows that the school’s ability to use technology in this way is not consistent.

**Infrastructure and staff support.** CES currently has multiple options for accessing technology. Classrooms are equipped with at least two student computers and a teacher computer. At the time of this survey, there were three desktop computer labs and one lab set up with laptops. There was another laptop cart available for teachers to check out. At each grade level, there were devices available as well. First through third grade each had an iPad cart to share among the grade level. Fourth grade shared a laptop cart. Fifth grade students had 1:1 iPads. Technical support for technology is provided through the district and the school’s technology teacher. Earlier in the survey, responses indicated that participants felt administrators were
supportive of changes in policy and practice. Table C6 shows more specifically how teachers are supported through the infrastructure and staffing at the school.

Table C6
*Supportive Environment: Infrastructure and Staff Support*

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers have access to enough computers, in the classroom, in a lab, or from a mobile cart, so that they can have one computer for every two students when needed for an activity.</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Teachers and students have sufficient access to projectors, printers, digital cameras, printers, and other hardware when I need it.</td>
<td>0</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Reliability and speed of external connections are sufficient for connecting to the Internet, using online databases, viewing online video, and accessing other resources.</td>
<td>0</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>“In my school…”</td>
<td>Strongly Agree (n)</td>
<td>Agree (n)</td>
<td>Neither Agree nor Disagree (n)</td>
<td>Disagree (n)</td>
<td>Strongly Disagree (n)</td>
<td>Do Not Know (n)</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>-----------</td>
<td>-------------------------------</td>
<td>-------------</td>
<td>----------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Students can access appropriate web resources and tools that teachers would like them to use without being blocked by filters.</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Teachers have ready access to technical support, e.g., to troubleshoot hardware or software problems, maintain systems.</td>
<td>0</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Technology facilitator and/or technology assistant positions are adequately staffed.</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Teachers and students have ready access to productivity software, e.g., graphic organizer, word processing, slide presentation, or drawing applications.</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
Table C6 Continued

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers and students have ready access to a good collection of print, multimedia, and electronic resources.</td>
<td>0</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>When educators are selecting resource media and software, they consider both the curriculum and the needs of learners.</td>
<td>4</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The media center can be flexibly scheduled to provide equitable access to resources and instruction.</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Computer labs can be flexibly scheduled for equitable access to resources and instruction.</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Several questions asked participants to evaluate the access to computers, printers, cameras, reliable internet access, and web resources. Due to the number of options for technology access at CES, it was surprising that seven teachers, slightly more than half of respondents, disagreed there were enough computers in a classroom or lab that they could have one computer per two students. In following questions, participants were asked about the flexible scheduling of computer labs, media centers, and mobile labs to allow for equitable access. The majority of responses to these statements showed that teachers felt access to these areas of the school were adequate with only two participants disagreeing with each statement. This seems to contradict the data from the previous question about enough computers for a 2:1 student to device ratio. Access to a reliable internet connection and appropriate web resources for students showed a positive response with 61.54% of participants agreeing with the statements, though three disagreed access to reliable internet was adequate. While this is not currently a concern of the administration, it is something on their radar for the
future. The assistant principal of CES shared that she had concerns over the ability to maintain reliable wireless connections as the number of devices continue to grow.

This subsection also addressed participants’ access to support personnel. Responses suggested that participants did not feel there was sufficient support with only 30.77% agreeing there was ample access to technology support and only 15.38% agreeing that technology positions were adequately staffed. At CES, the technology teacher supports staff with hardware and software needs after a help ticket has been placed with the district’s online technology help desk. At the school level, there are no staff members specifically tasked with assisting teachers with technology integration. At the district level, there is one Technology Instructional Specialist and two Instructional Technology Coaches. Much of the professional learning from these district supports are done through voluntary sessions completed outside of the school day.

**Implications of a vision, budget, and support.** The Supportive Environment section of the STNA provided insight into what teachers believe about the environment at CES related to technology. First, it is clear that most teachers believe the school has a vision for technology integration, though it may not be well communicated to the community. The definition of “community” in the survey is unclear, but a lack of communication could lead to different understandings of the vision between teachers, administration, and families. Secondly, teachers’ responses about access were varied. The fact that a number of teachers felt access to computers was inadequate was surprising. As a teacher at CES, I have rarely found it impossible
to secure access for my students as long as I planned the activity in advance. On the other hand, if many teachers wanted to use devices daily during instruction, it would be challenging to accommodate that need. Those who felt access to computers was inadequate may believe so for a variety of reasons. First, the STNA uses the word “computers.” CES does have multiple computer labs and laptop carts, but as the school increases devices they have chosen to fund iPad purchases. While I was under the assumption teachers may consider all digital devices when answering this question, it is possible they were only considering desktop and laptop computers. Additionally, as a teacher at CES I have heard teachers voice their reluctance to integrate technology because they know it is not possible to have consistent access throughout the instructional day. These low-frequency technology users may have responded that there is insufficient access due to the simple fact that it is impossible to integrate technology consistently with the present number of devices. High-end users may have responded that there is insufficient access for similar reasons. These teachers may be frequently checking out devices for their class and come face-to-face with moments where it was inconsistently available for a week-long project. As CES continues to increase access to devices, they may need to look at how often the current labs and mobile carts are being used.

The supportive environment section of the STNA did not specifically reference professional development; however, the question about technology assistants and facilitators may provide some initial information about this need. Teachers generally agreed that technology facilitator and assistant positions are inadequately staffed. This
is important to note because if teachers want some assistance with integrating technology, they generally believe there may not be enough staff out there to provide support.

**Professional Development**

The second section of the STNA asked teachers to respond to statements about what professional development opportunities would be beneficial as well as the quality of currently professional development opportunities. Tables C7 and C8 represent the data collected in this section.

**Professional development needs.** Professional development for teachers at CES takes place during after-school staff meetings, district-wide professional development days, and optional trainings after school. Professional development related to technology has included training on UDLibSearch and Schoology. An Apple Professional Learning Specialist also came to each grade level for iPad training. Additionally, CES teachers have led sessions on Seesaw and Edublogs. At the start of 2018, the principal began an “APPy New Year” program where teachers briefly wrote about an app they enjoyed, why they enjoyed it, and how it can be used in the classroom. Table C7 represents teachers’ beliefs about the professional development needs at CES.
<table>
<thead>
<tr>
<th>“I would benefit from professional development on…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research-based practices I can use in my teaching.</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Identification, location, and evaluation of technology resources, e.g., websites that I can use with my students.</td>
<td>4</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Performance-based student assessment of my students.</td>
<td>3</td>
<td>8</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The use of technology to collect and analyze student assessment data</td>
<td>4</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Learner-centered teaching strategies that incorporate technology, e.g., project-based or cooperative learning.</td>
<td>5</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Online security and safety.</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>The use of technology for differentiating instruction for students with special learning needs.</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Uses of technology to increase professional productivity.</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>“I would benefit from professional development on…”</td>
<td>Strongly Agree (n)</td>
<td>Agree (n)</td>
<td>Neither Agree nor Disagree (n)</td>
<td>Disagree (n)</td>
<td>Strongly Disagree (n)</td>
<td>Do Not Know (n)</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>------------------</td>
<td>---------</td>
<td>-------------------------------</td>
<td>-------------</td>
<td>---------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Ways to use technology to communicate and collaborate with families about school programs and student learning.</td>
<td>2</td>
<td>7</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ways to use technology to communicate and collaborate with other educators.</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Alignment of lesson plans to content standards and student technology standards.</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Use of research or action research projects to improve technology-enhanced classroom practices.</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Use of data for reflecting on my professional practices.</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Use of data to make decisions about the use of technology.</td>
<td>4</td>
<td>6</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Across the board, most teachers agreed they would benefit from professional development on almost every topic. Each professional development topic had at least eight participants agree it would be beneficial. As CES considers future professional development, it would be helpful to look specifically at areas where there were no teachers who disagreed with the need for professional development. These include the use of technology to differentiate instruction, increasing professional productivity, identification and evaluation of technology-based student resources, and performance-based assessments. In each of these areas only one teacher chose “neither agree nor disagree” with the remaining 12 choosing some level of agree. On the opposite end, the largest area of “disagree” was present in the statement about using technology to communicate and collaborate with families. While nine teachers still responded with a
desire for professional learning on this topic, the fact that it had four respondents disagreed was unsurprising. Technology professional development offerings in the past have included training on the various platforms used for communication and collaboration (Seesaw, Edublogs, and Schoology). Additionally, teachers were required to use these platforms, so some learning may have happened independently as well.

**Professional development quality.** Unlike the first subsection which asked teachers to look forward at what would be beneficial, the questions in this subsection were directed at the quality of current professional development. Table C8 represents teachers’ beliefs about technology professional development offered by CES and the district.
Table C8

*Professional Development: Professional Development Quality*

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educators in charge of professional development use data from teachers' needs assessments to determine technology professional development topics and activities.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Technology professional development is timely.</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Technology professional development is relevant.</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Technology professional development is ongoing.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Teachers have an opportunity to evaluate technology professional development activities in which they participate.</td>
<td>0</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table C8 Continued

<table>
<thead>
<tr>
<th>“In my school…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The impact of technology professional development is tracked using data on classroom practice.</td>
<td>0</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>The impact of technology professional development is tracked using data on student learning.</td>
<td>0</td>
<td>5</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

The data in this section has minimal – if any – teachers “strongly” agreeing or disagreeing and spreading out responses almost evenly amongst agree, neither agree or disagree, and agree. The STNA Interpretation Guide explains that this type of a response suggests more information may need to be collected to make any specific inferences or decisions. A majority of teachers did respond positively to the statement “teachers have an opportunity to evaluate technology professional development activities in which they participate.” This is expected since almost all professional development sessions provided by the school district are followed by an evaluation via Google Forms at the conclusion of the day. The statement drawing the most negative response within this subsection was the statement regarding the timeliness of
professional development. Six teachers responded that they disagreed professional development was timely. Though more information would need to be collected to understand why they disagreed, it is possible that the current infrequent offerings could contribute to this feeling.

Implications of professional development quality and needs. The Professional Development section of the STNA naturally provided important information about the state of professional development and future needs. Teachers generally seemed open to professional development in any of the topics suggested. Many teachers even felt professional development in communicating with families would be beneficial. Earlier in the survey, 100% of teachers agreed this was an area where technology was already being used. As I created professional learning modules for my ELP, I used this data to identify which topics most interested teachers.

This section also offers insight on teachers’ understanding of the current professional development situation at CES. It is difficult to make any broad conclusions here due to the varied answers from agree to disagree; however, it is important to note that many teachers felt technology professional development was not timely. This is something I considered in both planning my professional learning modules for my ELP and as I aimed to understand how CES can support its vision for technology integration going forward.
Teaching and Learning

In this section of the STNA, participants were asked to respond to the frequency in which teachers and students use technology for various tasks. The data for this section can be found in Tables C9 and C10.

Teacher technology use. Outside of student devices mentioned earlier, classrooms at CES are also equipped with SMART Boards, document cameras, and each teacher has an iPad. The data in Table C9 shows the frequency in which teachers are using this technology to engage in specific activities.

Table C9
Teaching and Learning: Teacher Technology Use

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Daily (n)</th>
<th>Weekly (n)</th>
<th>Monthly (n)</th>
<th>Once per Grading Period (n)</th>
<th>Never (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I consult publications, online journals, or other resources to identify research-based practices I can use in teaching with technology.</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>I identify, locate, and evaluate technology resources for use by my students, e.g., websites.</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>I apply performance-based student assessment to technology-enhanced lessons, e.g., student portfolios, student presentations.</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
Table C9 Continued

“In the settings where I work with children…” | Daily (n) | Weekly (n) | Monthly (n) | Once per Grading Period (n) | Never (n) | Do Not Know (n)
--- | --- | --- | --- | --- | --- | ---
I use technology regularly to collect and analyze student assessment data. | 2 | 1 | 3 | 4 | 2 | 1
My lessons include technology-enhanced, learner-centered teaching strategies, e.g., project-based learning. | 0 | 4 | 3 | 4 | 0 | 2
I apply policies and practices to enhance online security and safety. | 4 | 2 | 1 | 1 | 1 | 4
I use technology to differentiate instruction for students with special learning needs. | 3 | 6 | 3 | 0 | 0 | 1
I use technology to support and increase my professional productivity. | 8 | 0 | 3 | 0 | 0 | 2
I use technology to communicate and collaborate with families about school programs and student learning. | 4 | 7 | 1 | 1 | 0 | 0
I use technology to communicate and collaborate with other educators. | 7 | 3 | 2 | 1 | 0 | 0
My lesson plans refer to both content standards and student technology standards. | 2 | 4 | 0 | 1 | 4 | 2
Table C9 Continued

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Daily (n)</th>
<th>Weekly (n)</th>
<th>Monthly (n)</th>
<th>Once per Grading Period (n)</th>
<th>Never (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I do research or action research projects to improve technology-enhanced classroom practices.</td>
<td>2</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>I use multiple sources of data for reflecting on professional practice.</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>I use multiple sources of data to make decisions about the use of technology.</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>I use technology to participate in professional development activities, e.g. online workshops, hands-on training in a computer lab.</td>
<td>1</td>
<td>0</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Teachers are most frequently using technology for personal productivity and collaborating with other educators. In some ways, this was anticipated. Since all grade levels are on different schedules, communication between teachers is often done via email. On the other hand, I was not expecting to see productivity show up as both the most frequent use and an area for desired professional development. In the previous section, 12 out of 13 respondents agreed that professional development on using technology to increase professional productivity would be beneficial.
The highest response of “never” in this section were four teachers. This occurred for the statements on using of multiple data sources to make decisions about the use of technology and referring to content standards and technology standards in lesson planning. The question about using data sources to make decisions about technology use could be confusing for teachers. Teachers may not know what data sources would be helpful to look at when making decisions about technology. The question about lesson planning asks how often teachers refer to content standards and technology standards. While teachers are frequently asked to review content standards, it is possible that teachers are unaware of student technology standards or how students’ digital skills align with the Common Core Standards. Student technology standards have not typically been presented formally to teachers or referenced during professional development, and so teachers may be less familiar with the topic. Of those that do refer to content and student technology standards, only six are doing so more than once a grading period. Looking back at the professional development section, eight teachers agreed professional development in aligning lesson plans to content and technology standards would be beneficial.

**Student technology use.** Though teachers report earlier in the survey that there may not be enough devices for students when needed, the school does have iPads, laptops and desktop computers available for student use. The data in Table C10 represents how frequently students are using technology to accomplish a variety of activities.
Table C10
*Teaching and Learning: Student Technology Use*

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Daily (n)</th>
<th>Weekly (n)</th>
<th>Monthly (n)</th>
<th>Once per Grading Period (n)</th>
<th>Never (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students use a variety of technologies, e.g., productivity, visualization, research, and communication tools.</td>
<td>4 4 2 2 0 1</td>
<td>1 2 3 3 3 1</td>
<td>3 2 5 3 0 0</td>
<td>1 1 1 3 5 2</td>
<td>1 2 1 5 1 3</td>
<td>1 4 3 2 2 1</td>
</tr>
</tbody>
</table>
Table C10 Continued

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Daily (n)</th>
<th>Weekly (n)</th>
<th>Monthly (n)</th>
<th>Once per Grading Period (n)</th>
<th>Never (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students use technology to support higher-order thinking, e.g., analysis, synthesis, and evaluation of ideas and information.</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Students use technology to create new ideas and representations of information.</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Teachers report that students are most frequently using technology to access online resources and information. Teachers also report that students are using a variety of technologies, with zero teachers responding “never” to that statement. Students are less frequently using technology to collaborate with those outside of the classroom and to utilize tools that professional researchers use. Three teachers responded “I do not know” to the question about completing technology-based projects that demonstrate real-world applications. This was the highest number of “I do not know” in this subsection and represents nearly 25% of respondents. This indicates that some professional learning may be needed to explore these types of activities so that teachers are aware of what opportunities exist to use technology in this way.
Implications of technology use. Understanding how teachers are currently using technology is helpful when planning future professional learning opportunities. For example, while teachers agreed on the need for professional development on professional productivity and differentiation, many are already engaging in these activities daily or weekly. Teachers are not as frequently referring to content and technology standards when lesson planning, with four teachers responding they never engage in this practice. Professional development surrounding lesson planning when integrating technology may be beneficial. Another area where teachers may need guidance is in understanding how to leverage technology for use with performance-based assessment and real-world applications. Less than half of respondents reported using technology to enhance performance-based student assessment such as student portfolios or student presentations more than once per grading period. Few teachers are frequently having students use technology to complete projects approaching real world applications of technology. Three respondents were not sure whether or not this was happening when they were working with children. When it comes to other student uses of technology, there were few activities students were frequently engaging in daily or weekly. With several avenues for accessing devices, I would be interested in learning what students are doing with the technology in their hands. Finally, this section revealed that many teachers are using technology to engage in professional development at least three times a year. This is promising as my professional learning modules are presented on an online platform, Schoology.
Impact of Technology

The final section of the STNA asked participants to respond to how the integration of technology impacts both students and teachers. Data from this section can be found in tables C11 and C12.

Teacher impact. This section tells a lot about teacher’s pedagogical choices when it comes to student technology use. As CES increases the number of devices at the school, Table C11 represents how teachers feel technology has influenced their instructional practices.

Table C11
Impact of Technology: Teacher Impact

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>My teaching is more student-centered and interactive when technology is integrated into instruction.</td>
<td>3</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>My teaching practices emphasize teacher uses of technology skills to support instruction.</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>My teaching practices emphasize student uses of productivity applications, e.g., word processing, spreadsheet.</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>
Table C11 Continued

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>My teaching practices emphasize student uses of technology as an integral part of specific teaching strategies, e.g., project-based or cooperative learning.</td>
<td>2</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

Most teachers, 10 out of 13, believe that integrating technology allows for more student-centered and interactive instruction. This suggests that when teachers are choosing to use technology they are likely choosing digital tools that allow for participation, choice, and student to student or teacher to student interaction. Many teachers also report that their teaching practices include student technology use as part of specific teaching strategies. According to the section on teaching and learning, four teachers are employing these technology-enhanced strategies weekly, three are doing so monthly, and four only once per grading period.

The statement with the largest percentage of disagreement, five out of 13 teachers, was the statement that teachers emphasize students use of productivity applications such as word processing and spreadsheets. At CES, some of these
productivity applications are specifically taught during the students’ weekly technology class. Others are utilized during core content, but may not be explicitly explained to students. During the PTA Board focus group, one parent raised a concern that students need more support with basic skills, such as typing. I would be interested in learning more about why teachers are not emphasizing the use of these applications.

**Student impact.** Earlier in the survey, many teachers disagreed that multiple sources of data are used to evaluate the impact of technology initiatives on student outcomes. Table C12 represents teachers’ beliefs about the impact of technology on students.

<table>
<thead>
<tr>
<th>“In the settings where I work with children…”</th>
<th>Strongly Agree (n)</th>
<th>Agree (n)</th>
<th>Neither Agree nor Disagree (n)</th>
<th>Disagree (n)</th>
<th>Strongly Disagree (n)</th>
<th>Do Not Know (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology has helped my students become more socially aware, confident, and positive about their future.</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Technology has helped my students become independent learners and self-starters.</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Technology has helped my students work more collaboratively.</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
The data in this section suggests a positive outlook for the impact of technology on students. With the exception of the first statement, no participants disagreed with the statements. In fact, almost all teachers agreed that technology has increased engagement in learning. The first statement, on the increase of social awareness and confidence, may need some more exploring. Three participants responded that they did not know if this was true and one participant disagreed. Interestingly, there were a higher number of participants (five) that were undecided about whether or not technology has helped students achieve greater academic success. In addition, another teacher responded, “Do Not Know.” I would be curious how teachers thought about such a broad term: academic success. If based on state-wide assessments, CES has consistently scored near the top of the state for elementary schools. It may be hard for teachers to see a connection between increased
technology use and academic success using this measure. Furthermore, if student use of technology is infrequent, such as what is noted in some responses from Table 10, teachers may be unable to make any decisions about its’ impact as opposed to instructional strategies they use daily.

Another area worth noting was student collaboration. Eight participants agreed that technology has helped students work more collaboratively. This goal was also mentioned in an interview with the assistant principal at CES. She shared a hope that the use of applications such as Google Docs would help students collaborate on projects in the future. This impact of technology on collaboration seems to be specifically about student-student collaboration. Though many teachers felt technology positively impacted students’ collaborative skills, in Table 10 only three teachers responded that students used technology daily or weekly to communicate and collaborate with others beyond the classroom. This could be an interesting area of growth, moving from student-to-student collaboration to giving students opportunities for collaboration with others outside the classroom.

**Implications of the impact of technology.** This section revealed teachers’ understanding about how technology has impacted their instruction. A positive mindset towards the impact of technology is an important step. In a multi-case study of 12 teachers highly-skilled at integrating technology, Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) found that teachers’ beliefs about the use of technology were the biggest factor in their decision to use technology. Even when external barriers, such as inadequate access to technology, were present, teachers’
strong positive beliefs towards technology integration allowed them to utilize technology in meaningful ways. The teachers surveyed tend to agree that technology has increased student engagement and collaboration. Additionally, many teachers have been able to create more student-centered learning creating more independent learners. Seeing that many teachers agree technology has impacted their instruction in a positive way is important in planning professional development. It creates a buy-in for teachers that technology does have an important place in instruction.

Recommendations

The purpose of the STNA is to collect data in an effort to improve the use of technology in teaching and learning. The following recommendations are directly related to the previous summaries of the data and anchored in research on technology integration. In making recommendations, I looked at each section of the STNA and identified areas of need. Additionally, I identified some areas in each section where more follow-up was needed before a specific recommendation could be made.

Supportive Environment

Recommendation 1: Improve communication of technology vision. Lim, Zhao, Tondeur, Chai, and Tsai (2013) discussed the importance of a clear and well-communicated vision for technology integration. They identified a lack of planning as a contributing cause to the gap between technology trends in society and the use of technology in schools. One recommendation to help close this gap was to create and communicate a technology policy plan that could be “considered a blueprint for all stakeholders” (p.65).
My ELP centers around the need for a clear vision for technology and developing professional learning opportunities. I was surprised that a majority of participants agreed that a vision for technology has been created through the collaboration of stakeholders. This has been a concern of mine since no such vision is written on the school website or even internal documents. Instead, the results of the survey suggest that better communication of this vision is needed.

**Recommendation 2: Increase technology support for teachers.** Unsurprisingly, participants found technology positions to be understaffed at CES. The school has one technology teacher who teaches classes at each grade level and also assists teachers with their technology needs. The district has one technology instructional specialist and two instructional technology coaches, but no specific positions at the building level. It is unlikely there is funding in the budget at this time for more technology positions at the building level. Instead, I would recommend an attempt to increase the number of staff members willing and able to support others with technology needs. The responsibility would then be shared by more than one teacher whom also teaches classes full time.

Schrum and Levin (2013) conducted a multi-case study of eight schools identified as exemplary technology-using schools. They found that many of these exemplary schools used “distributed leadership” (p. 39) to develop teacher leaders and empower them to share what they know with others. This often created a culture of informal professional development within the buildings. In all eight schools, teachers reported that this informal professional development was an important part of their
professional learning. At the start of the 2018-2019 school year, administration at CES asked for each teacher to identify possible leadership opportunities. This timing created a great opportunity for teachers to begin to lead some technology initiatives and increase the technology support within the school. Along with two colleagues, I approached our principal about beginning some technology-based professional learning. I currently help lead voluntary, one-hour sessions that occur every two months. This opens up the door for the possibility of increased professional learning about technology integration school-wide.

**Areas needing follow-up. Financial resources.** The STNA showed only four teachers agreed that supplemental financial resources are actively pursued. Before making any recommendations on this topic, I think more information would need to be collected current awareness of funding sources. Previous supplemental funding included the PTA technology line item primarily used for devices and a Study Island subscription. Currently, though not specific to technology, funding is available through a PTA mini-grant and other teachers have had success with DonorsChoose.org projects.

**Adequate access.** The school, district, and Parent Teacher Association has contributed funding to provide iPads and laptops in addition to desktop labs and a progressive one-to-one program. Yet, 53.85% of participants disagree that there is adequate access to computers in order for two students to share one device. While the district supplied all fourth-grade students with iPads in the 2018-2019 academic year, access at other grade levels remained the same. Since teachers generally agreed that
computer labs and mobile labs were able to be flexibly scheduled for access, I would recommend administration look further into why some teachers believe there is inadequate access and how to improve that perception. Perhaps there are broken devices leading to insufficient access or scheduling problems with using the labs or carts when needed. There are times when grade level iPad carts are left unused; so, perhaps opening scheduling calendars to other grade levels would help increase access.

**Professional Development**

**Recommendation 3: Increase technology-based professional development offerings.** It is clear from the STNA responses that teachers desire professional development in the area of technology integration. For each proposed topic, no less than eight teachers out of 13 agreed professional development would be beneficial. With a broad range of needs, I would suggest beginning with professional development on instructional planning and identifying technology resources in an effort to build teachers’ technological pedagogical content knowledge (TPACK). Pedagogical knowledge, instructional goals, and a knowledge of technological skills all play an important role in effective technology integration. TPACK extends past proficiency in content, pedagogy, and technology as separate bodies of knowledge. Instead, it is a deep understanding of how these domains interact with each other (Koehler & Mishra, 2009).

I recommend introducing the Hutchison and Woodward (2013) Technology Integration Planning Cycle as a way to get teachers thinking about their instructional
goals and digital choices. The Technology Integration Planning Cycle develops teachers’ TPACK by building upon their pedagogical content knowledge. Within this planning cycle, teachers begin by choosing an instructional goal. Next, teachers choose a digital tool and then critically evaluate the affordances and limitations of the tool. Leveraging the affordances of a digital tool can help engage students in learning the core content as well as new digital skills during the lesson.

It was surprising to see that out of 13 teachers, four report never referring to content and student technology standards when planning instruction and only six report they do so daily or weekly. Providing professional development on instructional planning would help guide teachers in the importance of using both content standards and technology standards when deciding to incorporate technology. Additionally, 12 teachers agreed they would benefit from professional development on the identification, location, and evaluation of technology resources.

Part of planning lessons that are integrated with technology is being able to choose what digital tool best fits the instructional goals. Student achievement does not come just from the technology itself; but, through teachers’ abilities to make decisions about technology that lead to quality instruction (Lawless & Pellegrino, 2007). This is an important concept for teachers to understand, especially because many teachers reported they were undecided about the impact of student technology use on student achievement.

As a part of my ELP, I have created online learning modules that address the Technology Integration Planning Cycle (Hutchison & Woodward, 2013). These
learning modules will walk teachers through the steps of identifying their instructional goals, considering their students’ digital skills, and choosing digital choices. Additionally, these modules offer teachers an opportunity to explore a variety of digital tools, giving them support when it comes to choosing a digital tool that best supports their instructional goal.

**Recommendation 4: Increase the use of technology to communicate and collaborate.** Less than half of CES teachers reported their students using technology daily, weekly, or monthly to reach beyond the walls of the classroom. The introduction of technology into schools provides a unique opportunity to communicate and collaborate outside of the confines of the school building. The National Education Technology Plan (U.S. Department of Education, Office of Educational Technology, 2016) highlights the importance of using technology to expand student opportunities. With technology tools, learners can collaborate with students studying similar topics around the world or communicate with experts in the field.

I recommend teachers look to increase students’ opportunities to use technology to communicate and collaborate with others. Applications such as Seesaw allow students to independently post pictures, videos, and text to a digital learning portfolio or a public blog. This allows students the opportunity to bring pieces of the classroom to their families and communicate their learning. Within the portfolio or blog, students are able to engage in communication about their work through comments. Video chatting applications such as Skype allow students to interact with experts in their field. These types of interactions can enrich research projects by
allowing students to get answers to specific questions and relate what they have read about to real-life experiences. Collaborative Internet Projects allow classrooms in different schools to research together and share their learning with each other via the internet.

The NETP (U.S. Department of Education, Office of Educational Technology, 2016) also suggests that as teachers increase this communication and collaboration they should also instruct students on digital citizenship and how to use technology in a meaningful, respectful, and safe manner.
Teacher Survey Questions (Modified STNA)

1. What grade level do you teach? (Choose 1)
   a. 1st
   b. 2nd
   c. 3rd
   d. 4th
   e. 5th
   f. Related Arts

2. What devices do you have available to your classes? (Choose all that apply.)
   a. 1:1 iPads
   b. iPad Cart
   c. Laptop Cart

Supportive Environment for Technology Use

- For each item, check the box below the response that best matches how much you agree with the statement - “Strongly Agree,” “Agree,” “Disagree,” or “Strongly Disagree.”
- If you do not have enough information to form an opinion about the topic of an item, select “Do Not Know.”
- If you have enough information to form an opinion but are simply split between “Agree” and “Disagree,” select “Neither Agree nor Disagree.”
In my school...

1. A vision for technology has been developed through an effective collaboration among stakeholders, e.g., administrators, specialists, teachers, students, and community members.

2. The vision for technology use has been effectively communicated to the community.

3. Administrators model effective uses of technology.

4. Administrators support changes in school-level systems, policies, and practices related to technology.

5. The amount of money budgeted for technology resources is sufficient for continuously updating and replacing technology systems as they become outdated.

6. Supplemental sources of funding are actively pursued to support technology, e.g., external grants, collaboration with community or parent groups, support from businesses.

7. Multiple sources of data are used to evaluate the impact of technology initiatives on student outcomes.

8. Technology is used to communicate and collaborate with families about school programs and student learning.

9. Technology is used to communicate and collaborate with the community about school programs designed to enhance student learning.
10. Teachers have access to enough computers, in the classroom, in a lab, or from a mobile cart, so that they can have one computer for every two students when needed for an activity.

11. Teachers and students have sufficient access to projectors, printers, digital cameras, printers, and other hardware when I need it.

12. Reliability and speed of external connections are sufficient for connecting to the Internet, using online databases, viewing online video, and accessing other resources.

13. Students can access appropriate web resources and tools that teachers would like them to use without being blocked by filters.

14. Teachers have ready access to technical support, e.g., to troubleshoot hardware or software problems, maintain systems.

15. Technology facilitator and/or technology assistant positions are adequately staffed.

16. Teachers and students have ready access to productivity software, e.g., graphic organizer, word processing, slide presentation, or drawing applications.

17. Teachers and students have ready access to a good collection of print, multimedia, and electronic resources.

18. When educators are selecting resource media and software, they consider both the curriculum and the needs of learners.

19. The media center can be flexibly scheduled to provide equitable access to resources and instruction.
20. Computer labs can be flexibly scheduled for equitable access to resources and instruction.

21. Mobile computers can be flexibly scheduled to provide equitable access to resources and instruction.

**Professional Development**

- For each item, check the box below the response that best matches how much you agree with the statement - “Strongly Agree,” “Agree,” “Disagree,” or “Strongly Disagree.”
- If you do not have enough information to form an opinion about the topic of an item, select “Do Not Know.”
- If you have enough information to form an opinion but are simply split between “Agree” and “Disagree,” select “Neither Agree nor Disagree.”

*I would benefit from professional development on...*

1. Research-based practices I can use in my teaching.

2. Identification, location, and evaluation of technology resources, e.g., websites that I can use with my students.


4. The use of technology to collect and analyze student assessment data.

5. Learner-centered teaching strategies that incorporate technology, e.g., project-based or cooperative learning.

6. Online security and safety.
7. The use of technology for differentiating instruction for students with special learning needs.

8. Uses of technology to increase my professional productivity.

9. Ways to use technology to communicate and collaborate with families about school programs and student learning.

10. Ways to use technology to communicate and collaborate with other educators.

11. Alignment of lesson plans to content standards and student technology standards.

12. Use of research or action research projects to improve technology-enhanced classroom practices.

13. Use of data for reflecting on my professional practices.

14. Use of data to make decisions about the use of technology.

15. Use of technology to participate in professional development activities, e.g. online workshops, hands-on training in a computer lab.

In my school...

1. Educators in charge of professional development use data from teachers' needs assessments to determine technology professional development topics and activities.

2. Technology professional development is timely.

3. Technology professional development is relevant.

4. Technology professional development is ongoing.
5. Teachers have an opportunity to evaluate technology professional development activities in which they participate.

6. The impact of technology professional development is tracked using data on classroom practice.

7. The impact of technology professional development is tracked using data on student learning.

**Teaching and Learning**

- For each item, check the box below the response that comes closest to indicating how often you do the described activity - “Daily,” “Weekly,” “Monthly,” “Once per Grading Period,” or “Never”.
- If you do not have enough information to select a number response for an item, select “Do Not Know.”

*In settings where I work with children…*

1. I consult publications, online journals, or other resources to identify research-based practices I can use in teaching with technology.

2. I identify, locate, and evaluate technology resources for use by my students, e.g., websites.

3. I apply performance-based student assessment to technology-enhanced lessons, e.g., student portfolios, student presentations.

4. I use technology regularly to collect and analyze student assessment data.

5. My lessons include technology-enhanced, learner-centered teaching strategies, e.g., project-based learning.
6. I apply policies and practices to enhance online security and safety.

7. I use technology to differentiate instruction for students with special learning needs.

8. I use technology to support and increase my professional productivity.

9. I use technology to communicate and collaborate with families about school programs and student learning.

10. I use technology to communicate and collaborate with other educators.

11. My lesson plans refer to both content standards and student technology standards.

12. I do research or action research projects to improve technology-enhanced classroom practices.

13. I use multiple sources of data for reflecting on professional practice.

14. I use multiple sources of data to make decisions about the use of technology.

15. I use technology to participate in professional development activities, e.g. online workshops, hands-on training in a computer lab.

16. Students use a variety of technologies, e.g., productivity, visualization, research, and communication tools.

17. Students use technology during the school day to communicate and collaborate with others, beyond the classroom.

18. Students use technology to access online resources and information as a part of classroom activities.
19. Students use the same kinds of tools that professional researchers use, e.g., simulations, databases, satellite imagery.

20. Students work on technology-enhanced projects that approach real-world applications of technology.

21. Students use technology to help solve problems.

22. Students use technology to support higher-order thinking, e.g., analysis, synthesis, and evaluation of ideas and information.

23. Students use technology to create new ideas and representations of information.

Impact of Technology

- For each item, check the box below the response that best matches how much you agree with the statement - “Strongly Agree,” ”Agree,” ”Disagree,” or ”Strongly Disagree.”

- If you do not have enough information to form an opinion about the topic of an item, select “Do Not Know.”

- If you have enough information to form an opinion but are simply split between “Agree” and “Disagree,” select “Neither Agree nor Disagree.”

In settings where I work with children…

1. My teaching is more student-centered and interactive when technology is integrated into instruction.

2. My teaching practices emphasize teacher uses of technology skills to support instruction.
3. My teaching practices emphasize student uses of productivity applications, e.g., word processing, spreadsheet.

4. My teaching practices emphasize student uses of technology as an integral part of specific teaching strategies, e.g., project-based or cooperative learning.

5. Technology has helped my students become more socially aware, confident, and positive about their future.

6. Technology has helped my students become independent learners and self-starters.

7. Technology has helped my students work more collaboratively.

8. Technology has increased my students’ engagement in their learning.

9. Technology has helped my students achieve greater academic success.
References


Appendix D

ONLINE PROFESSIONAL LEARNING

These artifacts, presented together in this appendix, are a part of an online professional learning course designed for teachers at Center Elementary School (CES). The course is made up of five modules. Each of these modules focuses on introducing teachers to lesson design that integrates technology, applying what they have learned into practice, and reflecting on new knowledge. As a school, CES has increased access to technology; however, simply adding in technology is not enough to be effective (Mishra & Koehler, 2006). To be effective at integrating technology, teachers need to learn how to make meaningful decisions about digital choices and develop an understanding of how technology influences instruction (Ertmer & Ottenbreit-Leftwich, 2010). The National Education Technology Plan (U.S. Department of Education, Office of Educational Technology, 2016) encourages school leadership to ensure continuous professional development that provides teachers with the knowledge they need to locate, evaluate, and integrate technology in a way that supports student learning.

Learning Goals

Build technological pedagogical content knowledge. The overarching goal of the course is informed by Technological Pedagogical Content Knowledge...
(TPACK) (Mishra & Koehler, 2006). The TPACK framework describes three domains of teacher knowledge - content, pedagogy, and technology - as well as how all three of these areas influence one another during instructional design. Effective teaching with technology requires that teachers develop their technological pedagogical content knowledge (Mishra & Koehler, 2006). This knowledge is different than acquiring and using knowledge of technology as a separate entity. Technological pedagogical content knowledge is an understanding of how to draw on all three domains simultaneously to make decisions about teaching and learning (Neiss, 2011).

**Introduce the technology integration planning cycle.** To help teachers develop their TPACK, I focused on developing the ability to use the Technology Integration Planning Cycle (Hutchison & Woodward, 2013). The Technology Integration Planning Cycle was developed to assist teachers in designing literacy instruction which integrates technology. The cycle makes the planning process concrete with a set of steps and opportunities for reflection and evaluation. At the heart of the planning cycle is the instructional goal. Teachers begin with this in mind, followed by deciding their instructional approach. Teachers only begin to think about digital tools after the completion of those first two steps. The steps in the cycle ask teachers to think about how their digital choices impact their instruction. They consider what contributions the tool can bring to helping students meet the instructional goal. They also consider how their digital choice may put constraints on learning and whether they can overcome those obstacles. Teachers are encouraged to
constantly reflect on the influences content, pedagogy, and technology have on one another. If the constraints of a tool overwhelm the contributions, teachers are told to abandon that tool and choose another or include a non-digital choice in their lesson.

**Design of the Professional Learning**

**Situated learning.** CES has not had many required sessions for professional learning about technology. The sessions that have been offered tend to overemphasize the technology and do not provide much opportunity to directly apply learning to instruction. This type of learning, “one-shot” workshops (Lawless & Pellegrino, 2007), generally only shows teachers how to use a tool. These types of workshops are not always beneficial due to the rapid changes in technology and the fact that learning is removed from context (Mishra & Koehler, 2006).

My professional learning modules follow a design-based approach which alleviates some of this disconnect (Lawless & Pellegrino, 2007). Design-based professional learning is situated in context and considers the needs, content, and devices of the learner. Teachers need knowledge about the technology itself; but, they also need knowledge about how the affordances of different tools can support learning goals (Ertmer & Ottenbreit-Leftwich, 2010). I organized the professional development around three different grade levels and content-based learning goals. In modules 2, 3, and 4, I modeled how to integrate technology in 1st grade English Language Arts, 3rd grade Mathematics, and 5th grade Science. Additionally, I demonstrated the practice of reflecting on digital choices and considering how those tools impact instructional decisions.
Reflection is an essential component (Mesmer & Karchmer, 2003; Lawless & Pellegrino, 2007; Kelly & Charkowski, 2015). Recursive professional development allows teachers to participate in a cycle of learning, application, and reflection (Mesmer & Karchmer, 2003). I have embedded opportunities for teachers to reflect upon their learning and instructional practices using discussion boards and FlipGrid. Additionally, teachers are asked to share reflections and their work with their colleagues through Google Slides and Padlet. Building collaborative relationships can have an impact on sustained growth for teachers (Mouza, 2009; Ertmer & Ottenbreit-Leftwich, 2010).

**Knowledge processes.** Much like teachers using the Technology Integration Planning Cycle, after I decided on the instructional goals of the Schoology course, I needed to make pedagogical decisions about my instructional approach. The modules were designed to engage teachers in four knowledge processes (Cope & Kalantzis, 2016) throughout the activities: experiencing, conceptualizing, analyzing, and applying. Teachers’ actions, moving within these knowledge processes and creating relationships between the processes, help build their understanding of technology integration. Throughout the modules, teachers reflect on their personal experience, exposing themselves to new ideas, comparing lesson design strategies, making connections between topics, evaluating digital tools, and applying what they have learned to their own classroom context.
Module 1. An outline for Module 1 can be found in figure D1. In Module 1, teachers begin by reflecting on their current lesson planning process when integrating technology. I used the digital tool, FlipGrid, to facilitate this activity. A screenshot of the activity is found in Figure D2. All digital tools in this course were chosen to informally model how they can be used for instruction with students. FlipGrid allows participants to record responses with video and audio as opposed to written text. Students who are not strong writers can still fully share their thoughts. Students also can view and comment on others’ perspectives. To support teachers experiencing this app for the first time, I provided a PDF how-to guide for posting to FlipGrid.

Figure D1. Module 1: Technology Integration Planning Cycle.
In the next activity, teachers read the article “A Planning Cycle for Integrating Digital Technology into Literacy Instruction” by Hutchison and Woodward (2013). In activity 3, they conceptualize this knowledge by making connections between what was presented in the article and their current lesson design practice. Teachers return to FlipGrid, find their original video, and post a response comparing and contrasting their lesson design practice with the cycle suggested by Hutchison and Woodward (2013).

Participants experience additional information on the planning cycle in activity 4 using a Google Slides presentation informed by Hutchison and Colwell (2016). I recorded the Google Slides presentation in Screencastify in order to elaborate on
questions teachers should be asking themselves as they go through each step in the planning cycle. In activity 5, teachers begin to apply what they have learned about the planning cycle to their own context. Teachers are guided through a scaffolded collaborative Google Slides document. Figure D3 shows a screenshot of the slides. Teachers consider a lesson they have previously taught and then apply the planning cycle to this learning goal. All participants are working on the same document so that they can collaborate and reflect with one another by commenting on others’ work. Finally, in activity 6, teachers participate in reflection about what they have learned during this module. They continue to analyze the planning cycle, discussing the benefits and challenges of designing lessons in this way.

![Activity 5: Applying the Planning Cycle](image)

*Figure D3.* Module 1, Activity 5: Applying the planning cycle.
Module 2. In Module 2, teachers dive more deeply into evaluating the constraints and contributions of various iPad apps. The outline of Module 2 is shown in Figure D4. The module itself is situated in the context of writing instruction. Teachers experience how to use the planning cycle within a first grade writing instructional goal. Throughout the module, they are immersed in my process of identifying a learning goal, making a digital choice, and using the evaluation tool to decide whether or not to use the chosen technology for instruction.

Figure D4. Module 2: Evaluating iPad apps and technology integration in writing.

The module begins by briefly introducing the context from which I will explore my instructional choices, first grade narrative writing. After that, teachers share experiences as they tap into their prior knowledge. Using the app Padlet, teachers record their current perspective on what makes an app appropriate to use with students. I chose to model the app Padlet in this activity because its affordances allow
users to collaborate by sharing ideas in one location. Figure D5 is a screenshot of the Padlet in this activity. To support teachers experiencing Padlet for the first time, I recorded two screencasts using both Screencastify and the iOS screencasting tool to demonstrate how to access Padlet on an iPad or using Google Chrome.

![Figure D5. Module 2, Activity 2: Padlet brainstorming.](image)

Results from my teacher survey indicated that CES teachers were interested in learning more about how to identify, locate, and evaluate digital resources. In activity 3, teachers experience content surrounding this topic. I created an online menu using Google Docs. A screenshot of this menu is shown in Figure D6. In the menu, I described a few writing-based apps, their cost, and included an image of the app icon. In activity 3, teachers choose two apps to explore for 10-15 minutes. Using FlipGrid,
teachers conceptualize their learning by describing one of the apps and identifying which elements they liked or disliked.

### iPad Apps for Writing Instruction

<table>
<thead>
<tr>
<th>Name</th>
<th>Cost</th>
<th>Description</th>
<th>App Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book Creator One</td>
<td>Free</td>
<td>Students can create one book using text, audio, drawings, video, and images. Students can choose different layouts for their book, including a comic book design. Once complete, books can be downloaded as an iBook or a movie file.</td>
<td><img src="image" alt="App Icon" /></td>
</tr>
<tr>
<td>Book Creator</td>
<td>$4.99</td>
<td>Similarly to Book Creator One, students can create one book using text, audio, drawings, video, and images. With Book Creator, students are able to create more than one book.</td>
<td><img src="image" alt="App Icon" /></td>
</tr>
<tr>
<td>Write About This</td>
<td>$3.99</td>
<td>The app provides images and writing prompts for students. “Quick Writes” allow students to take or upload a photograph, write about it, and include audio. Multiple authors’ work can be saved in the app. Writing can be saved and shared as an image.</td>
<td><img src="image" alt="App Icon" /></td>
</tr>
<tr>
<td>Toontastic 3D</td>
<td>Free</td>
<td>This app is marketed as a “creative storytelling app.” In Toontastic, students animate and narrate their own cartoons. Students record their voice doing the storytelling as they move the characters around the screen.</td>
<td><img src="image" alt="App Icon" /></td>
</tr>
</tbody>
</table>

*Figure D6. Module 2, Activity 3: Menu of writing apps.*

In activity 4 and 5, teachers learn how to analyze iPad apps. I created two evaluation tools, one for content-based apps and another for creation apps. The evaluation tools are presented in Figures D7 and D8. These tools were informed by several other rubrics I evaluated during my ELP. Teachers experience these evaluation tools as a PDF, as well as a Screencast explaining each of the elements teachers will examine and why they are important to consider.
**Figure D7.** Module 2, Activity 4: Content-based iPad app evaluation tool.

<table>
<thead>
<tr>
<th>Instructional Use</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the content in the app connected to your instructional goals?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the app provide immediate feedback for students?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the app provide a performance report for teachers and/or parents?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Independence</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the app intuitive and user-friendly for your students?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are instructions available for students? (Including pictures or audio for non-readers)</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Logistics</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do students need to sign in to the app with a username and password?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can students access their work after leaving the app?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there advertisements?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is the app free?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Engagement</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are there incentives (i.e., digital badges, avatars) for students to use the app?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is the skill-level of the content differentiated for students?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure D8.** Module 2, Activity 4: Creation iPad app evaluation tool.

<table>
<thead>
<tr>
<th>Creation of Content</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can students add video?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can students record their own voice?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Can students add images?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Are students able to collaborate with others?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Independence</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the app intuitive and user-friendly for your students?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are instructions available for students? (Including pictures or audio for non-readers)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Will students be able to reuse the app for multiple projects throughout the year?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Logistics</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do students need to sign in to the app with a username and password?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Can students access their work after leaving the app?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there advertisements?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is the app free?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sharing</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are students able to export their creation for publishing?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A screencast in activity 5 introduces the app Book Creator One and models how teachers will analyze contributions and constraints based on the evaluation tool. In activity 6 teachers apply their knowledge by creating their own screencast. Teachers go through the planning cycle, choosing an instructional goal first. They then review the app menu and choose an app they feel would best support the learning goal. They use the evaluation tool to critically analyze the app and consider its constraints and contributions. Using screencast, teachers describe their thoughts on the app and whether or not it would be a good match for their instructional goal, based on the evaluation. Finally, teachers link their screencast to the Padlet to share with others and comment on another colleague’s work.

Module 3. Similar to Module 2, in Module 3 teachers continue to work on evaluating iPad apps for their instruction. The module is situated in the context of math instruction and opens by modeling my instructional design for a third grade math lesson. The new knowledge for teachers in this lesson is the introduction of virtual manipulatives. Specifically, Math Learning Center (MLC) has developed ten free iPad apps, nine of which are virtual manipulatives. In the fall of 2018, CES adopted the MLC curriculum, Bridges in Mathematics. Since Bridges recommends using these apps throughout their curriculum, I wanted to let teachers experience using the apps and understand the contributions and constraints they provide to student learning. In activity 2, teachers view a menu describing each of these nine virtual manipulatives. Figure D9 shows a screenshot of the menu. Teachers choose two virtual manipulatives
to explore and then contextualize their learning by imagining the app in instruction and sharing their likes and dislikes on the FlipGrid.

**MLC Apps to Support Math Instruction in the Bridges Curriculum**

<table>
<thead>
<tr>
<th>Name</th>
<th>Cost</th>
<th>Description</th>
<th>App Icon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern Shapes</td>
<td>Free</td>
<td>Students can use this app to create designs with pattern blocks as well as fill in pre-made outlines. Students can measure the angles in different shapes and snap shapes to grid lines. Drawing and equation tools allow students to document their mathematical thinking on their creation. A video tutorial is available.</td>
<td></td>
</tr>
<tr>
<td>Numbers Pieces</td>
<td>Free</td>
<td>Within this app, students manipulate base ten blocks. They can drag blocks in their typical formation (100s, 10s, 1s) and then break them apart or combine them. Drawing and equation tools allow students to document their mathematical thinking. A video tutorial is available.</td>
<td></td>
</tr>
<tr>
<td>Pieces Basic</td>
<td>Free</td>
<td>This app is a lighter version of Number Pieces. It performs nearly the same functions. The base ten pieces are already pre-loaded to be different colors unlike the all yellow pieces in Number Pieces. This app does not have the measuring tool that is available in Number Pieces. Drawing and equation tools allow students to document their mathematical thinking.</td>
<td></td>
</tr>
</tbody>
</table>

*Figure D9. Module 3, Activity 2: Menu of MLC virtual manipulatives.*

In activity 3, teachers dig deeper into analyzing iPad apps that fall into the genre of virtual manipulatives. Using the Task Analysis Framework (Reiten, 2018) teachers further explore the affordances of virtual manipulatives to decide whether or not it is a good fit for their instructional goal. Reiten (2018) provides “Guiding Questions” that echo what teachers have already learned about the Technology Integration Planning Cycle (Hutchison & Woodward, 2013). The affordances in the
Task Analysis Framework are listed from lower-level to higher-level tasks to help teachers decide the type of knowledge needed for students to use the virtual manipulative (e.g. recall information, create explanations, make predictions, or make connections and generalizations between topics). Using the discussion board in activity 3, analyze their chosen manipulative and which affordances it exhibits according to the Task Analysis Framework.

The screencast of Pieces Basic allows teachers to learn about the functions of the app and observe a model for evaluating the contributions and constraints of this tool on third grade multiplication learning goals. In activity 5 teachers apply their knowledge by creating their own screencast of one virtual manipulative. Teachers practice going through the planning cycle, choosing an instructional goal first. They then review the app menu and choose a virtual manipulative they feel would best support the learning goal. Using both the evaluation tool from Module 2 and the Task Analysis Framework from Module 3, teachers critically analyze the app and consider its constraints and contributions. Teachers share their reflections on the app and whether or not it would be a good match for their instructional goal, based on their evaluation. Teachers link their screencast to a Padlet and comment on another colleague’s work.

Module 4. Module 4 is situated in science instruction; but, the digital tools that are demonstrated in this module are versatile for many different subject areas. Teachers are immersed in the experience of the planning cycle as I identify my 5th grade science learning goal and instructional approach. For the digital tools in this
module, teachers will examine SMART Lab activities for their use in supporting instruction. I have provided a screenshot of my SMART Lab activity menu in Figure D10. My rationale for including these tools is based on access and district priorities. CES has SMART Boards in every classroom. When they first arrived, there was a sense of excitement and engagement from students coming up to interact with the board. Over time, the novelty of the new technology has worn off. Even when students are able to manipulate the board, generally the interaction is still one student being called on while others watch and listen. SMART Lab activities change this dynamic by allowing multiple students to contribute to content on the SMART Board or review content on their own device.

SMART Lab activities have been a recent professional development push in the district as well. The district has scheduled a SMART trainer to complete a year-long session of workshops and in-class observations with a select cohort of teachers. CES has several avenues for using iPads - carts, 1:1 program - and so these activities are a perfect fit for increasing student engagement and making the SMART Board truly interactive. During activity 2, teachers explore two different SMART Lab activities and discuss their likes and dislikes on FlipGrid. To scaffold for teachers experiencing SMART Lab activities for the first time, I provided a screencast demonstrating how to set-up an account, choose activities, and assign activities to students.
Figure D10. Module 4, Activity 2: Menu of SMART Lab activities.

The screencast in activity 3 introduces teachers to the activity “Shout it Out” and models how to analyze the contributions and constraints of this tool to my fifth-grade science learning goals. Next, teachers use their knowledge to create their own SMART Lab activity. Teachers apply the planning cycle, choosing an instructional goal first. They then review the activity menu and choose an activity they feel would best support the learning goal. Using the evaluation tool from Module 2, teachers critically analyze the activity and consider its constraints and contributions. Next, they create a SMART Notebook file containing their activity and upload it to Padlet. In written text on their Padlet post, teachers explain what they have verbally shared in other modules: their learning goal, contributions and constraints of the digital tool, and
whether or not the tool is a good fit and why. Finally, teachers download another colleague’s file and leave feedback on their work.

**Module 5.** Reflection and collaboration are also crucial elements to professional learning impacting long-term change (Mesmer & Karchmer, 2003; Mouza, 2009; Ertmer & Ottenbreit-Leftwich, 2010). To conclude the course, I have posted one final reflection and three discussion boards. In the reflection activity, teachers consider how the content they have learned in the course has affected their teaching practices. A screenshot of this activity can be found in Figure D11. The series of discussion boards that follow the activity are designed to encourage continued collaborative work and reflection beyond the time spent in the course. Teachers are encouraged to use the Schoology discussion boards to add ideas of digital tools which support instructional goals, upload SMART Notebook files with SMART Lab activities, and reflect upon their teaching practices with supportive colleagues.
Figure D11. Module 5, Activity 1: Reflection on the modules.

**Screencasts.** I use screencasts throughout the course to model apps and share ideas. I chose this tool to provide visual support to teachers’ as they experience content and also to model how to use Screencasting in their own classrooms. Screencasts were used to elaborate on printed materials and demonstrate the step by step process of navigating a new app. Table D1 contains links to screencasts that represent these purposes.

Table D1

*Sample of Schoology Modules Screencasts*

<table>
<thead>
<tr>
<th>Module</th>
<th>Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1, Activity 4</td>
<td><a href="#">Presentation: Technology Integration Planning Cycle</a></td>
</tr>
<tr>
<td>Module 2, Activity 2</td>
<td><a href="#">Posting on Padlet</a></td>
</tr>
<tr>
<td>Module 2, Activity 4</td>
<td><a href="#">Evaluating Content-Based Apps</a></td>
</tr>
<tr>
<td>Module 3, Activity 4</td>
<td><a href="#">Evaluating Pieces Basics</a></td>
</tr>
</tbody>
</table>

I recently attended a professional development opportunity in our district and was presented with this quote:

*“Technology will never replace great teachers, but technology in the hands of great teachers is transformational.”*  
  
  ~ George Couros

Throughout each of the modules, we have looked at how technology is not just something “extra,” but instead, with thoughtful planning, can provide contributions to instruction that extend and transform instructional goals and practices. For our final activity, take some time to reflect on the modules in this course.

1) Look back at our first FlipGrid (password: Technology). How has the content in this course contributed to how you think about lesson planning with technology?

2) In the discussion space below, tell how what we have learned about technology integration connects to your professional practice. Consider the following:

- How has the content in this course contributed to your view of technology integration?
- How has identifying contributions and constraints of digital tools affected your instructional choices in the classroom?
- What is one goal you have as you move forward towards improving your instructional practice?
Accessing the Course

This appendix summarizes the content of each module; however, the course was designed to be fully experienced digitally. To access the course in its entirety:

1. Go to www.schoology.com and create an instructor account.
2. Choose “Courses” from the top menu.
3. Choose “My Courses,” found on the top right.
4. On the right-hand side, choose “Join a Course.”
5. When prompted for an access code, type “JB3G3-W2DWF”
References


Appendix E

PTA FOCUS GROUP AND RECOMMENDATIONS

Developing a clear vision for technology integration is complex. While Center Elementary School (CES) has several avenues for teachers to use devices – computer labs, iPads, laptop carts – creating a plan for what to do with that technology requires input from several stakeholders. In previous artifacts, I gathered information about teachers’ perceptions and use of technology and administration’s views on the role of technology at CES. Another important stakeholder is the Parent Teacher Association (PTA) at CES. CES has an active PTA and incredibly involved families. The PTA hosts family events and financially supports teacher mini-grants. Until the 2018-19 school year, the PTA also had a technology line item in its budget. Money for this line item was raised through large fundraisers such as CES’s “Walk-a-thon” (students raise money for walking laps) and spending was directed towards technology initiatives predetermined by the school administration. In the past, this included SMARTboards, laptops, Study Island subscriptions, and iPads. While teachers also join the PTA, it is primarily a group of parents. Therefore, aside from financial support, this group is an important stakeholder because of the investment they have in their children’s education. To learn more about the PTA’s technology line item and their views on technology as parents, I invited members of the PTA board to participate in a focus group on this topic.
Context of PTA Financial Support

Given the financial support through their technology line-item, I was interested in learning more about how that money had been raised and spent. My first four questions were presented to help gather information about spending history. This section describes spending of the PTA’s technology budget as reported by the focus group participants.

Previous spending. In 2013, the former principal of CES came to the PTA board and requested that they use their fundraising efforts to focus on increasing technology devices. At that time, the district had not rolled down any technology initiatives to the elementary schools, but the principal had seen a need for focusing on this at CES. The CES PTA began an annual “Walk-a-thon” to raise money for a technology line-item in the PTA budget. A smaller fundraiser selling food items in a Schwan’s catalog was also dedicated to the technology budget; however, funds raised were directed specifically to laptop purchases. Generally, over the years the technology budget funded any technology needs as directed by the principal. Primarily, it funded laptops, iPads and equipment needed to support these devices, such as cases and charging carts. The technology budget also supported a subscription to an online video website, BrainPop, toner for the school’s computer lab printer, and Study Island subscriptions for all students in grades 1 through 5. The Study Island subscriptions were continued until December 2018 when the contract ran out and the PTA decided not to renew.
At the start of the 2016-17 school year, the former principal at CES asked the PTA to focus, financially, on supporting the arts. In the fall of 2017, funding shifted again to support a school-wide celebration when CES was awarded a National Blue Ribbon Award. The decision to remove a spending focus from technology support was partially due to the approved referendum for iPads at the Middle School. A replacement cycle for iPads at the middle school meant that elementary schools would be getting the previously used iPads and CES would have less of a need for funding devices.

**Current spending.** The PTA board members I interviewed shared it was unlikely that the technology line-item would continue at the end of the 2017-18 school year. The Study Island subscriptions were paid through December 2018 and with administrative changes at both CES and the PTA – a new principal and a new PTA board – they felt it was time to re-evaluate the needs of the school.

Though there is not specific technology money raised or set aside, teachers are still able to fund personal technology needs through a teacher mini-grant program. PTA Mini-grants are used to fund small projects. This helps reduce any long-term contracts or expensive commitments, such as what happened with Study Island. This mini-grant line item supports teachers’ specific projects for a variety of needs. For example, I received funding for a VoiceThread subscription, microphones, and student subscriptions to RAZ Kids through the teacher mini-grant program. The PTA is able to use mini-grants to support teacher-specific technology needs without a
technology line-item. The mini-grant requires an application process and not all projects are awarded funding.

**Method**

**Participants**

Current members of the PTA Board were invited to participate in the PTA focus group. There were five total members and three accepted the invitation to participate, a participation rate of 60%. All were female, parents of one or more children at CES, and had served on the PTA in previous years.

**Data Collection and Analysis**

I conducted a group interview with a PTA focus group for twenty-five minutes and posed a series of semi-structured questions (Patton, 2015) on topics related to three areas of technology integration at CES: priorities, vision, and benefits/challenges. I purposely designed open-ended questions so I could follow up each by asking participants to elaborate upon their responses. The goal was to gather details and encourage discussion among them.

With permission, I audio-recorded the focus group session and later transcribed the conversation verbatim. Next, I employed deductive methods (Patton, 2015) by reviewing the transcripts repeatedly for excerpts and then details that elaborated upon the three areas of technology integration. This step was followed by grouping similar excerpts together from across the participants’ responses. Next, I looked for similarities and differences within and between the responses.
Results

This section is organized around the details I gleaned from the participants related to the areas of technology integration I focused on during the interviews.

Priorities

Participants reported the PTA prioritizes its use of funds based upon input from the school administration and teachers. Analysis of the transcripts revealed two themes related to the process. First, changing school leadership affected how the PTA prioritized its finances. For example, the previous principal focused on raising money to provide access to technology for students. The PTA was asked to focus fundraising efforts on purchasing SMART Boards, laptops, and iPads. The new principal, however, has prioritized the funding of family engagement events over fundraising events. For instance, the school did not host its annual “Walk-a-thon” fundraiser this year, but instead hosted “Owl Fest,” a free evening event for families.

Second, as a group, the participants agreed teachers were the experts on what works best for their students; therefore, they welcomed teacher input when prioritizing the use of funds. Participants stated they encourage teachers to engage in conversations with the PTA teacher liaison, so the teachers’ needs were heard by the PTA. Participants also noted their mini-grant line item as an avenue for sharing teacher needs with the PTA. During the focus group, the PTA members shared that this could help continue to fund specific technology projects if teachers proposed them.
Views on Technology

Stepping outside of financial support, I wanted to know what participants thought about technology in schools as the parents of CES students. I asked participants to answer questions about expectations they have for technology use and what benefits and challenges they see to using technology to support teaching and learning.

Expectations. Though the PTA has provided CES with laptops and iPads, there have been no set expectations for their instructional use. I asked participants to share what they would like to see in terms of technology use at CES. Only two out of three shared their thoughts; but, in general, they felt technology integration was an important factor in helping prepare students for “challenges they are going to be facing ahead of them.” Suggestions of specific technology use were sparse. One participant would like to see students focus on coding. She saw this skill as one students will need in the future and one that can be built upon if students learn the basics in elementary school. The same participant also felt that students could benefit from skill-review programs like Study Island. She admits that there were mixed feelings about the use of Study Island; however, she felt the program helped students relieve test anxiety by practicing with a format similar to Smarter Balanced testing. Another participant focused on the need for basic skills like typing at an early age. She felt that we take the time to teach and practice handwriting, and since typing is another form of written communication, teachers should take time to teach typing skills to students so that they can be proficient and not held back by that gap when completing assignments.
**Benefits.** Through their financial support of technology, the PTA has symbolically shown that they believe digital devices are a necessary tool for students and that technology has an important role to play at CES. Reflecting on the purchases the PTA has made in the past, I asked participants to describe some benefits to technology integration from their point of view. One participant shared that technology gives students a “different way to learn.” She likened the use of technology to how some students learn best by listening and others by doing. Technology, she suggested, offers another avenue for delivering instruction and practicing skills. This participant proposed that, with technology, students can work independently and ask questions as needed, instead of solely participating as a listener in a teacher-driven lesson. Another participant shared the importance of integrating technology is to expose students to the rapidly changing technology, so that they are aware of how technology changes and can adapt.

**Challenges.** Rapidly changing technology was also highlighted by participants as a challenge for the PTA. They mentioned how the PTA board has difficulty keeping up with the most current technology needs. This is why the PTA sees their mini-grant program as a more beneficial way to financially support technology. Funding small projects avoids long-term commitments in the ever-changing world of technology. They also believed that teachers had more of a gauge on what was changing in this area and having them submit mini-grants provided the flexibility to stay current.
Focus group participants raised concerns about the increase of technology use in classrooms. One participant stated a concern that too much technology could negatively impact instruction. She felt if students were using it all the time, it could become a “crutch” and instructional strategies that teachers have employed in the past would go to the wayside. Along those same lines, participants were concerned that too much technology usage would limit the personal interactions and social skill practice that kids need at this age. As technology use increases, one participant shared her concerns with keeping instruction accessible to students with disabilities. While there are many benefits to using technology, she stated concerns about students with vision and fine motor skills who could have difficulty accessing the iPads present in many schools. She suggests that solutions to these problems need to be available, such as alternate devices or alternate software.

Technology also plays an important role in communication with families; however, it can lead to challenges as well. Two participants brought up parent frustrations that teachers often utilize different technology tools to communicate with families. The PTA has one system, the school has another system, and then teachers across the school are using a combination of e-mail, Seesaw, Remind, and Schoology. One participant shared that, especially when parents have multiple children, it is easy to become disengaged because it is challenging to keep track of how each teacher prefers to communicate.
**Discussion**

The focus group responses indicate that there has been an inconsistent vision for funding technology initiatives since 2013. First, the funds have covered items ranging from printer toner, to online subscriptions, to digital devices. The purchases do not appear to support any particular initiative; but, instead fulfilled perceived needs in the moment. The current process for funding decisions was to ask administration to describe school needs. At the same time, they expressed that teachers are the experts of what is needed in the classroom. It seems that the PTA’s mini-grant funding may be an effort to shift some of the brainstorming for decision-making to teachers.

Secondly, the technology budget purchases did not include a plan for implementation or expectations for classroom use, leaving usage inconsistent in the building. For example, the PTA has funded laptop carts and partially funded iPad carts; however, grade level calendars show that some teachers use the devices daily or weekly and others use them monthly or less. Study Island was another expensive purchase with little follow-through on implementation. At first, teachers were expected to assign homework on the website. After the first year, the usage among teachers became more inconsistent, prompting the PTA to re-evaluate the subscription.

The purchase of Study Island subscriptions was also an indication of a mismatch between the PTA’s view on technology and the way in which the board spent funding. Through the focus group, I learned that some PTA board members view technology as a way to prepare students to meet challenges in the future.
Thinking about 21st century learning skills, students need to learn how to complete tasks such as critically evaluating information they find on the internet, creating digital media, and using technology to effectively communicate information (Partnership for 21-Century Learning, 2015). Though Study Island may have its place as a skill-review website, raising a large amount of funding for this resource does not match the desire to prepare students with the skills they will need to use technology strategically and capably in the future.

**Recommendations**

The current decision-making process is to ask the administration for their preferred focus and fundraise to meet those needs. Given the shift to focusing on family engagement instead of supporting specific school initiatives, I am not concerned with changing this process. Instead, I would like to propose a way to include technology in family engagement initiatives and provide some guidance on assessing mini-grant applications for teachers requesting app purchases.

**Using Technology to Increase Family Engagement**

**Rationale.** The PTA and administration expressed an interest in focusing on family engagement. To date, this has mostly included community-wide celebrations such as an annual school carnival and “Owl Fest,” an evening family event with vendors, games, and music. I would like to examine how technology can help boost family engagement in classroom activities and parent-teacher communication. Currently, the PTA board expressed frustration that teachers are using a variety of platforms to communicate with parents. While all teachers at CES are set up to use
the app Seesaw, many are also using the app Remind and e-mail newsletters. Others have set up their Seesaw account but have not used it consistently to communicate classroom activities with parents. I propose that CES could use Seesaw more efficiently to deliver information to parents, communicate progress, and create a school-wide digital community. Though this will take effort on the part of CES staff, the PTA can use their resources to support this process.

**Using Seesaw consistently.** CES teachers currently use the free version of Seesaw. It allows teachers to create and maintain a digital portfolio of their students’ work including notes, links, photographs, videos, and drawings. The app also functions similarly to a social media site allowing teachers to post photos of class events and tag students. Parents and students can view the journal feed and comment on their work. Portfolios can be set up as private between teacher, student, and parent or in “shared device” mode where students can see each other’s work when in the classroom. Parents and teachers can communicate through the messaging element of the app. To help ease the communication overload mentioned by the participants, I would recommend teachers use Seesaw exclusively to communicate reminders and post newsletters instead of adding Remind and weekly e-mails.

**Professional learning for teachers.** While the PTA cannot mandate or enforce more consistent use of Seesaw, they can help by providing incentives for teachers to complete professional learning. As a teacher at CES, colleagues have expressed concerns that they have the Seesaw class created, but do not know what to do next. Teachers may not be aware of Seesaw features that allow them to complete
assignments with their students or engage classroom families in the digital community. Opportunities to learn more about Seesaw, practice utilizing it in the classroom, and reflecting on its impact may help increase usage for teachers.

In the past, teachers have received money for attending PTA-sponsored events. I propose that the PTA use its funding to compensate teachers for after-school Seesaw professional learning sessions. Seesaw already has many videos online showing teachers everything from the basics of the Seesaw app to how to integrate it in various instructional areas. There are also current CES teachers undergoing Seesaw Ambassador training who are willing to support their colleagues. What teachers do not have is an incentive to continue their learning. If the PTA would like CES to focus on one method of communication for teachers and parents, I suggest that they put forth effort in educating teachers in how to best use Seesaw to engage families in everyday classroom activities and student learning.

**Learning opportunities for families.** In addition to educating teachers on how to use Seesaw, I recommend that the PTA provide learning opportunities for family members. Using the app may not be intuitive for some. For example, families may miss messages because they do not have the correct settings. They may not have a smartphone and are unsure how to use the web version of Seesaw. Learning opportunities can also show families the benefits of joining a digital community with their child and teacher. These sessions can walk families through the basics of signing up and show them how to utilize all of the tools such as commenting, saving a picture, or downloading a portfolio. Finally, they can provide families with suggestions on
how to engage their child in discussion about what they are learning and creating in school.

**Consider a subscription to Seesaw for Schools.** Seesaw for Schools is a paid version of the Seesaw app. There are a few functions that could improve the use of Seesaw at CES. Not all features directly relate to family engagement, but they do support the administrative views on technology use at CES.

First, Seesaw for Schools allows for centralized administration of Seesaw accounts. This means that the school manages accounts for all students and seamlessly transfers students to new classes each year. Less setup for teachers means that parents will not need to reconnect each year. There will be no delay in starting Seesaw at the beginning of the school year. This centralized management also allows students’ portfolios to follow them from year to year. Parents and teachers can see the growth their students have made as they follow their journey through elementary school.

With Seesaw for Schools, teachers can assign “skills” to student work and assignments. They can then rate student performance with a 1-4 score. Our district has indicated a move towards a standards-based report card in the near future. This feature could help teachers grade work efficiently and see student progress over time. Additionally, the “skills view” shows a color-coded map of class performance which could be used to inform instruction. Teachers who create assignments on Seesaw can easily share their work with colleagues through the Schoolwide Activity Library.
The administrator view of Seesaw for Schools allows principals and assistant principals to be involved classroom communities digitally. They can use the dashboard to view specific students or whole classrooms and comment on student work. Administrators can also view data on Seesaw usage and parent engagement. Since Seesaw for Schools is an expense, this data could possibly be used to justify funding in the future.

I learned during the focus group that PTA board members are hesitant to commit to any long-term expense due to the rapid changes in technology. Seesaw for Schools would be a yearly contract. The data provided by the company would help the PTA follow-up on usage and impact. Coupled with professional learning for teachers and sessions for parents, this could be a powerful tool for keeping parents engaged in what students are learning and creating at school.

Adding an App Proposal to the Mini-Grant Application

Rationale. The PTA is relying on teachers to be the experts of what needs their students may have. They count on this knowledge to help keep classrooms current, especially when it comes to technology. Unfortunately, in the world of iPad apps, it can be hard to differentiate what apps may be useful for instruction. At first glance, an app may seem beneficial for purchase, but it may not meet instructional goals as much as it appears. One issue with Study Island, as participants shared, was that there were mixed feelings on its use. As a teacher at CES, I know that not all teachers used the program. And, as a doctoral candidate, my content analysis helped me discover that the content was not well-aligned to my standards.
Going through the beginning steps of the Technology Integration Planning Cycle (Hutchison & Woodward, 2013) and evaluating apps for their contributions and constraints can help reduce funding of apps that do not adequately meet instructional goals. Additionally, focusing on iPad apps within the mini-grant program can help teachers “think strategically,” as the PTA board has requested. Once purchased and loaded, these iPad apps can be used by any student who uses that iPad. On the first, second, and third grade iPads, the app would theoretically be available to any grade level since those devices are cart based and available for check-out by any teacher.

**Mini-grant application.** I have created two templates for teachers requesting to use the mini-grant to purchase iPad apps. In order to keep the application straightforward like its original, I created separate applications for content apps and creation apps. This allowed me to focus the questions to important elements of evaluation. The mini-grant applications ask teachers to report on some features of the app as determined from the App Evaluation Tool in the online professional learning modules. The application also asks teachers to share how they intend to use the app instructionally. The participants in the focus group shared a desire to fund applications that had the ability to reach many students. Reporting which devices will need the app helps calculate a cost for funding and helps the PTA determine the potential reach of the mini-grant. A copy of the applications is included at the end of this appendix.
Focus Group Questions

1. Why has money been set aside specifically for technology in the PTA yearly budget?

2. How is money for the technology line item raised each year?

3. What has the technology budget purchased in the past?

4. What is the decision-making process for spending money from the technology budget?

5. What is your vision for technology integration at Center Elementary?

6. What, if any, expectations do you have for technology use at Center Elementary?

7. What benefits do you see in using technology to support teaching and learning?

8. What challenges do you see in using technology to support teaching and learning?

9. How can Center Elementary staff help support the PTA in their technology spending decisions?

10. Is there anything else I need to know about the PTA’s technology line item or technology integration at Center Elementary that I may not have covered?
Mini-Grant Application for Content-Based iPad Apps

Teacher(s): _____________________________________________________

Grade Level(s): __________________________________________________

Name of app: ____________________________________________________

Cost: ________________________________

This app will be loaded onto (check all that apply):

☐ 3rd Grade Cart
☐ 2nd Grade Cart
☐ 1st Grade Cart
☐ 3rd Grade 1:1
☐ 4th Grade 1:1
☐ 5th Grade 1:1

Evaluation of the App:

Can the app be used across grade levels and content? ☐ Yes ☐ No
Does the app provide feedback for students? ☐ Yes ☐ No
Does the app provide progress reports to parents and/or teachers? ☐ Yes ☐ No
Is the content differentiated for students? ☐ Yes ☐ No

Briefly describe how you envision using this app in your classroom. In your description, include how many students will utilize the app, how frequently you intend to use it, and what instructional goals you hope to meet through the use of this app.

____________________________________________________________________

____________________________________________________________________

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____________________________________________________________________

____________________________________________________________________

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____________________________________________________________________

____________________________________________________________________
Mini-Grant Application for Creation iPad Apps

Teacher(s): _____________________________________________________

Grade Level(s): __________________________________________________

Name of app: ___________________________________________________

Cost: __________________________________________________________

This app will be loaded onto (check all that apply):

☐ 3rd Grade Cart  
☐ 2nd Grade Cart  
☐ 1st Grade Cart  
☐ 3rd Grade 1:1  
☐ 4th Grade 1:1  
☐ 5th Grade 1:1

Evaluation of the App:

Can the app be used across grade levels and content?  ☐ Yes  ☐ No
Does the app allow students to add audio, video, and/or photographs?  ☐ Yes  ☐ No
Are students able to save their work?  ☐ Yes  ☐ No
Are students able to share their creations once complete?  ☐ Yes  ☐ No

Briefly describe how you envision using this app in your classroom. In your description, include how many students will utilize the app, how frequently you intend to use it, and what instructional goals you hope to meet through the use of this app.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

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References


Appendix F

INFOGRAPHIC

As a part of my ELP, I collected data from three important groups of stakeholders to learn about their perspectives on the current state of technology integration at CES. First, I surveyed teachers at CES using the School Technology Needs Assessment (STNA) (SERVE Center, 2007). The STNA is available through the William and Ida Friday Institute for Educational Innovation – a part of North Carolina State University’s College of Education. This survey was sent via e-mail to all 39 teachers at CES and 13 teachers completed the survey. I gathered information about teachers’ perceptions of technology use at CES and insight into their professional development needs. Secondly, I interviewed the principal and assistant principal at CES. These semi-structured interviews helped build on my understanding of the schools’ vision for technology integration, including possible challenges. Finally, I facilitated a focus group with members of the Parent Teacher Association board at CES. As leaders of the PTA they were able to share how the board has financially supported technology in the past and how decisions are made regarding PTA funds. As parents of students at CES, they were also able to share the benefits and challenges they see of using technology in their children’s education and their vision for how they hope to see students and teachers using technology in the future.
In an effort to make connections between these three pieces of data and share the most important points in a visual format, I created an infographic using the online program Piktochart. I have included the infographic at the end of this appendix in Figure F1. It can also be accessed at https://create.piktochart.com/output/31558267-technology using the password “Technology.” The purpose of an infographic is to communicate information via a combination of words and graphics. The visual nature of an infographic improves recall of the content presented (Dunlap & Lowenthal, 2016). Infographics should be able to stand alone as an easily navigated resource (Toth, 2013); however, for the purpose of my ELP I have expanded upon each section of the infographic below.

My intention is to share this infographic with the administration at CES to begin a discussion on the school’s current practice and a possible path for future professional development. Teachers may also find this infographic useful as it highlights the administrations and PTA board’s perspective on technology integration. Finally, the infographic can be shared with the PTA Board members to help communicate current technology use and possible future needs. During the focus group, the PTA Board shared the importance of communication between the teachers and PTA liaison to assist in supporting any technology needs. This infographic may provide some additional information for the PTA on teachers’ technology integration perspective.
**Current Devices**

CES teachers have several different choices for technology devices. At the time of the interviews, surveys, and focus group, classrooms had at least two student computers and a teacher computer. The exception to this was specials classrooms. The music, art, and PE classrooms did not have student computers. For activities where more students need access to a device, there were three PC desktop computer labs, one lab set up with laptops, two sets of laptops, and three sets of iPads. Fifth grade students were each provided with their own iPad. Technology access at CES has been made possible through district and building funds as well as contributions from the Parent Teacher Association (PTA). Laptops and iPad access, along with their assigned grade, estimated cost, and funding source is detailed in Table F1. This data is representative of the 2017-2018 school year, when the surveys, interviews, and focus group took place. The fifth grade iPads were not included in this table as they were passed down from the middle schools after three years of use.
Table F1

Cost and Funding Sources of Laptops and iPads at Center Elementary School

<table>
<thead>
<tr>
<th>Device</th>
<th>Grade Level</th>
<th>Estimated Cost</th>
<th>Funding Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 iPads</td>
<td>1st</td>
<td>$10,560</td>
<td>Building</td>
</tr>
<tr>
<td>20 iPads</td>
<td>2nd</td>
<td>$10,260</td>
<td>Building</td>
</tr>
<tr>
<td>25 iPads</td>
<td>3rd</td>
<td>$10,825</td>
<td>Building/PTA</td>
</tr>
<tr>
<td>30 Laptops</td>
<td>4th</td>
<td>$15,690</td>
<td>District</td>
</tr>
<tr>
<td>28 Laptops</td>
<td>Shared</td>
<td>$14,644</td>
<td>PTA</td>
</tr>
<tr>
<td>30 Laptops</td>
<td>Shared</td>
<td>$15,690</td>
<td>PTA</td>
</tr>
</tbody>
</table>

Note: All estimated costs of iPads include cases and Apple Care.

Is There Access for Students to Share Computers?

Out of 13 teachers surveyed, only five agreed that there were enough devices to have two students share one computer for an activity when needed. Table 2 represents the number of teachers at each grade level who agreed or disagreed with the survey statement.

Table F2

Are there enough devices to have two students share one computer for an activity?

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>Agree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2nd</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>3rd</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>4th</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>5th</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Specials Teachers</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
Due to the small sample size at each grade level, I cannot generalize that these responses were representative of all teachers on that team. The exception to this is fifth grade teachers. Both fifth grade teachers agreed that the access to devices was adequate; however, each fifth grader is assigned their own iPad for the school year. Therefore, one to one access is guaranteed at this grade level.

**How is Technology Used by Teachers?**

This section of the infographic uses data from the STNA to represent how teachers are using technology in the classroom. I first looked at those technology uses that were most frequent, with the highest percentage of teachers choosing “daily” or “weekly” use. These activities were collaboration and communication with families, personal productivity, and differentiation of instruction for students with special needs. The final percentage graphic represents a technology use that is less frequent among teachers – lesson planning. This question on the STNA referred to using curriculum and technology standards when lesson planning. Four teachers responded they never do this, and two others responded they did not know if they did. This stood out as a percentage to highlight because of my plan to incorporate lesson design as a part of my professional learning modules. Examining digital tools within the context of instructional goals is important for technology-based professional learning.

**What do Administrators and PTA Board Members Think?**

The data for this section was compiled from the interviews of CES administration and the focus group of PTA board members. These two stakeholders
are important to consider as CES works to improve its technology integration. The
principal and assistant principal hold substantial power in decisions surrounding
technology. They will ultimately make decisions about how school funds will be
spent, how teachers are expected to integrate technology, and what professional
development will be offered. The PTA Board also plays an important role for two
reasons. Until recently, the PTA funded some technology initiatives through a
technology line item in their budget. While this line item will likely not exist going
forward, the PTA will continue to fund teacher projects through their mini-grant
program and support whatever initiatives the administration deems important for the
school. Secondly, the PTA board is representative of the families at CES. It is
important for teachers to have an understanding of what parents expect when it comes
to the use of technology and for parents to understand how teachers are utilizing
technology currently available.

The purpose of the administration interviews was to gather information about
their vision for technology integration at Center Elementary and any expectations they
have for teacher and student technology use. I completed two one-on-one interview
sessions - one with the principal and one with the assistant principal of CES. The
interviews were semi-structured and took under ten minutes each to complete. Each
interview was audio recorded and transcribed. I reviewed the transcripts for themes
about professional development, teacher technology use, student technology use,
purposes for technology, and challenges in technology integration.
Four ideas emerged when I analyzed the data from those interviews. The principal and assistant principal saw technology integration as a way to increase engagement, increase efficiency, collaborate with others, and complete tasks that are not possible with traditional non-digital activities. One participant specifically talked about the use of Google Docs to allow students opportunities for asynchronous collaboration.

The purpose of the PTA Board focus group was to gather information about how technology funds are raised and spent. Additionally, I wanted to learn how the administration and teachers at CES can help support the technology choices, specifically to aid successful implementation of new programs or devices. During this interview, I learned that the PTA would be discontinuing their technology line item; however, the data collected still helps understand the PTA Board’s perspective on technology integration and can be used to work on guiding the PTA’s support of technology-based resources. Five PTA Board members were invited to the focus group and three participated. The questions were semi-structured and the focus group took approximately 25 minutes to complete. The responses were audio recorded and transcribed.

The PTA board shared somewhat different ideas for student technology use than administration. One participant talked about the importance of teaching students’ technology-specific skills such as coding to prepare them for future careers. Another participant discussed how basic typing skills are often challenging for students moving into a 1:1 program and should be taught alongside
handwriting. Finally, one participant pointed out the benefits of an online program such as Study Island. This program, which the school formerly subscribed to, provided students with test-taking practice similar to the computer-based Smarter Balanced Assessment students in grades 3-5 take at the end of the year. Overall, the PTA discussed the importance of teacher input in this area as technology is frequently changing and teachers are often the ones who have a pulse on what the newest or most beneficial tool may be.

What Are Teachers’ Professional Development Needs?

This section represents data from the STNA and the interviews with administration. During the Professional Development portion of the STNA, teachers were asked to rate on a 5-point Likert scale whether or not they felt certain topics would be beneficial. The topics in which the most teachers strongly agreed or agreed are listed as the “top needs” in this section. These topics include identification, location, and evaluation of technology resources, performance-based assessment, using technology to differentiate instruction, and increasing professional productivity. Professional learning on the identification, location, and evaluation of technology resources pairs well with the lesson planning needs identified in the previous section.
Figure F1. CES Technology Integration Infographic. Enlarged image available at https://create.piktochart.com/output/31558267-technology (Password: Technology)
References


Appendix G

IRB APPROVAL LETTER

DATE: March 27, 2018

TO: Maureen McDonald
FROM: University of Delaware IRB

STUDY TITLE: [1195962-1] Exploring Technology Integration

SUBMISSION TYPE: New Project

ACTION: APPROVED

APPROVAL DATE: March 27, 2018

EXPIRATION DATE: March 26, 2019

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # (6,7)

Thank you for your submission of New Project materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.
Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.