TO CHOOSE OR NOT TO CHOOSE...IS IT REALLY A QUESTION? A MIXED METHODS STUDY EXPLORING STUDENT CHOICE, ASSESSMENT, AND TECHNOLOGY USE OF THE ELEMENTARY 21st CENTURY LEARNER

A Dissertation

Presented in Partial Fulfillment of the Requirements for the

Degree of Doctor of Philosophy

With a

Major in Educational Leadership in the

Department of Graduate Education
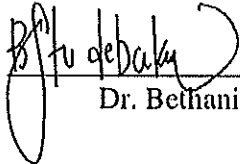
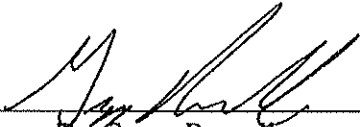Northwest Nazarene University

by

Amy C. Ackley

May, 2019

Major Professor: Bethani Studebaker, Ed.D.

AUTHORIZATION TO SUBMIT

DISSERTATION

This dissertation of Amy Christine Ackley, submitted for the degree of Doctor of Philosophy in Education with a major in Educational Leadership and titled "To Choose or not to Choose... Is it Really a Question? A Mixed Methods Study Exploring Student Choice, Assessment, and Technology Use of the Elementary 21st Century Learner," has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies.

Major Professor _____ Date 4/9/2019
Dr. Bethani Studebaker

Committee
Members _____ Date 4-9-19
Dr. Gregg Russell

_____ Date 4-9-19
Dr. Brian Fox

Doctoral
Program Director _____ Date 4/9/2019
Dr. Heidi Curtis

Discipline's
College Dean _____ Date 4/9/19
Dr. Michael Pitts

ACKNOWLEDGMENTS

The words "Thank you" do not seem adequate when addressing the many individuals involved in my doctoral journey. First, to my Committee Chair, Dr. Bethani Studebaker, the support shown throughout the dissertation and research process has been not only that of an expert in your field, but also a mentor, friend, and cheerleader. The road to getting your doctorate is so much more than an advanced degree. Thank you for being my compass through this journey of self-reflection and transformation. Dr. Gregg Russell, so many of my professional milestones include you. I do not believe that is by accident. You taught me, challenged me, and partnered with me, always pushing me to be a better educator than I was the day before. Thank you for continuing to be a part of my journey. Dr. Brian Fox, your belief and hope in what education can afford others is evident, not only in your career path, but also in the investment of your personal time. Thank you for your belief and investment in me.

Northwest Nazarene University's mission is transformation of the whole person. I am proof of that mission. Without the influence of this university in my life and education, I would not be who I am today. A daughter, a wife, a mother, a colleague, an advocate, and an educator who seeks Christ with all her heart, soul, mind, and strength.

To my partner in education, Dr. Michelle Van Beek, we started this together and finished it together! Thank you for being 'that' friend I could count on. Whether it be a long night of studying, coffee, a good laugh or cry...thank you for being there. I am so proud of us!

DEDICATION

Some say that it takes a village to raise a child. I say it takes a village to complete a doctorate. This dissertation is dedicated to *my* village.

First and foremost, my husband Matt, you have always said you are my biggest fan and you have proved it again through this process. Your belief in my abilities carried me through when my self-belief wavered. Thank you for your love, patience, and the many extra responsibilities you took on without ever once complaining. You are my rock and the love of my life.

To my children, Allyson and Tyler, there is no doubt that you bore many of the sacrifices that came as a result of my educational and professional pursuits. Despite those, you supported my every step. My love for you inspired me daily to push forward. Follow your passions in life, and remember it is never too late to fulfill a dream.

Mom and Dad, Chuck and Lynnie Hagemeier, thank you for raising a girl with 'fight', tenacity, and character. Although we never dreamed I would one day use those attributes for *this,* they sure came in handy. No matter the endeavor I have taken on in life, you have always been my champions, backing me with your unconditional dedication and steadfast love …praying me through the process. I love you.

To family and friends, when my doctoral degree started, many of my other activities halted. Thank you for standing by my side, cheering me through my rough days and celebrating my mini milestones throughout this adventure. Looking forward to more time spent with you.

G.G., although you are not here today, there is no denying the influence you had on who I have become. You share in this accomplishment today.

ABSTRACT

The ever-changing workplace of current society calls for instructional shifts to the predominately traditional educational system in existence today. In order to successfully navigate a globalized culture, the instructional makeup and educational structure must include knowledge of core subjects, student-centered learning environments, as well as literacy and mastery of recognized 21st century competencies. Effective implementation of 21st century skills requires modifications in assessment practices, educational policy, research-based curriculum, and instructional design, providing students opportunity for deeper application and learning of content. Research is needed regarding pedagogical practices, incorporation of 21st century learning skills, and a student's perceptions of learning. This explanatory sequential mixed methods study explores upper elementary student perceptions surrounding choice in evidencing learning during student-driven assessments using self-selected technology-based platforms. Frequency analysis was used to examine quantitative data collected by the Likert-based Technology Choice & Academic Efficacy Student Perception Survey. Survey results indicated strong majority agreement among participants concerning student choice of technology and evidencing learning. A principle components analysis revealed correlations in the data between technology-based choice during assignments and student's academic efficacy and engagement. Coding was used to examine qualitative focus group data, major themes emerged including Engagement, Efficacy, and Learning Process, all centered on a student's foundation of Experience and Exposure. Results indicate that practices including self-selected technology choice during assignment completion should be used to positively influence a student's perception of a task, shaping learner engagement, efficacy, 21st century mindset, and ownership in the learning process.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter I

Introduction

Research indicates there is a misalignment that exists concerning the advancing needs of current society and the predominately traditional educational system instructing students today (Aslan & Reigeluth, 2013; Grant et al., 2014; Henriksen, Mishra, & Fisser, 2016; Horn, Staker, & Christensen, 2015; Johnson, 2009; Sharkey & O'Connor, 2013; Voogt, Erstad, Dede, & Mishra, 2013; Wagner, 2012; Wright & Jones, 2018). An argument stands that the technology-based information age of present-day culture calls for a shift towards a more learner-centered approach in both instructional and assessment practices (Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Faulkner & Latham, 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh, Tan, & Ng, 2012; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012). The Partnership for 21st Century Learning (P21), a collaboration of educational stakeholders, identified specific proficiencies and knowledge students need to excel within the demands of today's society (Hilton, 2015; Johnson, 2009; P21, 2007). Not only were core subjects, such as reading, writing, and mathematics identified, but also recognized was the importance of such skills as creativity and innovation, critical thinking, problem-solving, initiative, the ability to self-direct, as well as competencies in technology and media (Aslan & Reigeluth, 2013; Ellis, 2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2015; Voogt et al., 2013; Wagner, 2012).

For many schools operating under the industrialized educational structure of teacher-driven classrooms, implementation of the recognized 21st century skills would call for pedagogical shifts of instructional practice (Aslan & Reigeluth, 2013; Ellis, 2012; Evans & Boucher, 2015; Faulkner & Latham, 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014).

Among these revisions and pedagogical modifications would be the incorporation of student choice and intentional building of informational literacy and technology-based aptitudes (Aslan & Reigeluth, 2013; Brooks & Young, 2011; Buchanan, Harlan, Bruce, & Edwards, 2016; Ellis, 2012; Evans & Boucher, 2015; Hilton, 2015; Horn et al., 2015; Núñez & León, 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Thompson & Beymer, 2015; Trilling & Fadel, 2012; Vander Ark, 2018; Voogt et al., 2013). Technology can forever alter the personalization of the educational environment (Horn et al., 2015; iNACOL, 2015b; Pahomov, 2014; Vander Ark, 2018). The inclusion of student choice calls for a less prescriptive environment, placing more individual ownership of learning on students (Aslan & Reigeluth, 2013; Clark, 2012; Ellis, 2012; Flowerday & Schraw, 2000; iNACOL, 2014; Pahomov, 2014;). However, even this less prescriptive approach has confines within the student-centered classroom environment, suggesting "choice doesn't mean that students choose *everything*; it means that the curriculum respects that they have preferences, and honors those preferences as much as it can" (Pahomov, 2014, p.21).

The inclusion of choice along with student-driven assessments, where students have autonomy in regard to how learning is evidenced, can have a profound impact on students (Aslan & Reigeluth, 2013; Assor, Kaplan, & Roth, 2002; Clark, 2012; Ellis, 2012; Flowerday & Schraw, 2000, 2003; Gillard, Gillard, & Pratt, 2015; Núñez & León, 2015; Thompson & Beymer, 2015). Research reveals centralized themes surrounding the use of autonomous structures in the classroom and the measurable impact on assessment, learning, and a student's motivation (Alkharusi, Aldhafri, Alnabhani, & Alkalbani, 2014; Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Jacobson-Lundeberg, 2016). Literature establishes that self-regulated pupils acquire positive self-efficacy which leads to successful academic and study

routines (Alkharusi et al., 2014; Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Jacobson-Lundeberg, 2016). Students who self-perceive to be in control of their learning environment also show greater levels of intrinsic motivation, thereby increasing student engagement (Flowerday & Schraw, 2003). In fact, self-regulation and student-choice opportunities in the classroom cultivate additional capacities and skills identified as needed in a 21st century society, such as independently planning and monitoring time, creating productive workspaces, as well as locating valid and necessary resources efficiently (Clark, 2012; Crow, 2009; Hilton, 2015; Trilling & Fadel, 2012). Moreover, the offering of student regulated or autonomous structures in an instructional setting results in mindsets of competence, autonomy, and empowerment of students (Brooks & Young, 2011; Crow, 2009; Flowerday & Schraw, 2000, 2003; Gillard et al., 2015; Jacobson-Lundeberg, 2016; Pahomov, 2014; Scrabis-Fletcher & Silverman, 2017; Thompson & Beymer, 2015). Students empowered to take ownership of their individual, personal learning feel more competent. Furthermore, this student ownership increases meaning and relevance in a given task, and increases the perceived impact the task will have (Houser & Frymier, 2009).

The traditional American 'one size fits all' educational system is built around standardization, not personalization (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013). While this industrialized educational system sufficiently met the student needs and skills of former societies, the modern-day culture demands something different (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Mitchell, Skinner, & White, 2010; Nisha & Rajasekaran, 2018; Sharkey & O'Connor, 2013; Voogt et al., 2013). Today's workplace requires students to effectively problem solve, communicate, collaborate, innovate, process, produce, and

construct knowledge (Adams Becker, Freeman, Giesinger Hall, Cummins, & Yuhnke, 2016; Grant et al., 2014; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Nisha & Rajasekaran, 2018; Mitchell et al., 2010; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). Research suggests that these recognized skills can be nurtured using online tools, platforms, and applications (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). The use of technology in the classroom setting can enhance student learning, offering various avenues to process new information, as well as allow for student choice on multiple platforms to demonstrate learning of targeted standards (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012).

Statement of the Problem

The foundation of the educational system exists to serve and fulfill the student competencies needed to be successful in everyday life within the constructs of current culture (Aslan & Reigeluth, 2013; Horn et al., 2015; Voogt et al., 2013). This new society has challenged the traditional industrialized or standardized educational model by opposing the 'one-size fits all' philosophy with newly identified skills of the 21st century (Aslan & Reigeluth, 2013; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Pahomov, 2014; Trilling & Fadel, 2012; Voogt et al., 2013). Critical reflection and empirical reasoning are two elements of the 21st century mind that emphasize the need for an educational shift (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Buchanan et al., 2016; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Koh et al., 2012; Pahomov, 2014; Sharkey & O'Connor, 2013). To meet the demands of a globalized society, the instructional system must bring into line core subjects, the overall classroom environment, and literacy and knowledge of recognized 21st century abilities (Aslan & Reigeluth, 2013; Hilton,

2015; Horn et al., 2015; Johnson, 2009; Pahomov, 2014; P21, 2016; Sharkey & O'Connor, 2013; Voogt et al., 2013). Along with core subjects, many 21st century learning models call for students to be competent in a variety of 'soft skills' (Hilton, 2015; Horn et al., 2015, Johnson, 2009; Mitchell et al., 2010; Nisha & Rajasekaran, 2018; Pahomov, 2014; P21, 2016). These skills include communication, creativity, innovation, critical thinking, problem-solving proficiencies, deeper learning competencies, along with informational literacies, technology skills, and life and career dexterities such as initiative and self-direction (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Nisha & Rajasekaran, 2018; P21, 2016).

The call for these identified educational practices commands a major role reversal among educators and students (Aslan & Reigeluth, 2013; Ellis, 2012; Gillard et al., 2015; Pahomov, 2014). Today's standards require the evaluation of deeper levels of learning, such as analysis, synthesis, or evaluation. The traditional, non-process approach to assessment fails to provide the teacher or students with the adequate data to inform instruction (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Henriksen et al., 2016; Koh et al., 2012). A learner-centered approach to instruction includes an element of personalization where students participate in authentic, cross-curricular learning scenarios emulating both the knowledge and soft skills professional careers and real-life context comprise (Faulkner & Latham, 2016; Koh et al., 2012; Pahmov, 2014; Sharkey & O'Connor, 2013). An assessment must be mastery-based and criterion referenced, enabling students to be self-directed and engaged in the learning process (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Horn et al., 2015; Sharkey & O'Connor, 2013). In order to strengthen assessment practice, tasks must become individualized, multi-faceted, support instructional objectives, contain contextual scenarios, clarified objectives, scoring standards, and criterion (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Koh et al., 2012). Danielson (2013)

acknowledges this shift in her instructional framework, highlighting the active role of the student by identifying *Important Learning for Students* as an underlying assumption of her teaching framework:

> Educators, researchers, and policymakers concur that the traditional view of learning, focused on knowledge and procedures of low cognitive challenge and the regurgitation of superficial understanding, does not meet the demands of the present and future. Competitive industries in the 21st Century will be those whose workers can solve complex problems and design more efficient techniques to accomplish work. (p. 14-15)

Successful implementation of 21st century skills requires not only changes in assessment, but also the deployment of new educational policy, researched-based curriculum, and educational strategies all aimed at transforming and deepening the student learning environment (Adams Becker et al., 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Choice during student-driven assessments creates a cohesive instructional approach (Aslan & Reigeluth, 2013; Clark, 2012; Ellis, 2012; Gillard et al., 2015; Núñez & León, 2015; Thompson & Beymer, 2015; Westberg & Leppien, 2018). Research indicates that the inclusion of choice in student-driven assessments allows for student autonomy in the evidencing of learning and positively impacts student performance, engagement, self- efficacy, and motivation (Aslan & Reigeluth, 2013; Clark, 2012; Ellis, 2012; Gillard et al., 2015; Núñez & León, 2015; Thompson & Beymer, 2015). Additionally, current literature expresses the profound need for students to acquire identified 21st century skills, attributes, and mindsets to be successful in the current and future society (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Johnson, 2009; Sharkey & O'Connor, 2013; Voogt et al., 2013). Little to no research is available

to educators regarding pedagogical practices that involve the incorporation of 21st century learning skills. There are even fewer available studies focused on student perceptions involving a learner's ability to engage in choice and autonomy in evidencing learning during student-centered assessments using self-selected technology-based platforms. Moreover, educational research is calling for more student perspectives to be represented (Marshall & Rossman, 2015). Although it is the group most impacted by policy and program initiatives, often student voice is the least represented (Marshall & Rossman, 2015).

Studies indicate that a student's level of engagement in the academic process at the elementary level directly impacts a student's future academic engagement and achievement (Ladd & Dinella, 2009; Upadyaya & Salmela-Aro, 2013). Literature also supports a positive relationship between student choice or autonomy and a student's level of learning, engagement, motivation, and self-efficacy (Assor et al., 2002; Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Crow, 2009; Deci & Ryan, 2008; Evans & Boucher, 2015; Gillard et al., 2015, Núñez & León, 2015; Pahomov, 2014; Westberg & Leppien, 2018). Most current studies take place with secondary or college age students, however, and fail to address the influences and integration of 21st century skills taking place in the elementary school setting. The purpose of this mixed methods study was to examine student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms among upper elementary students. This study will address a gap in research with evidence that supports a positive dynamic between student choice and a student's level of learning, engagement, motivation, and self-efficacy (Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Crow, 2009; Deci & Ryan, 2008; Evans & Boucher, 2015; Gillard et al., 2015, Núñez & León, 2015; Pahomov, 2014).

Background

Often referenced as 21st century competencies or skills, various aptitudes have been identified as needed and essential for students' success in the present-day and future workforce (Hilton, 2015; Horn et al., 2015; Johnson, 2009; Nisha & Rajasekaran, 2018; P21, 2015; Voogt et al., 2013). Among the recognized 21st century proficiencies, dexterities related to both learning and technology have been established (Aslan & Reigeluth, 2013; Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2016; Sharkey & O'Connor, 2013; Voogt et al., 2013). The current globalized society demands that all students be equipped with 21st century skills, but still grapples with how these acknowledged capabilities should affect instructional practice (Adams Becker et al., 2016; Ellis, 2012; Faulkner & Latham, 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Multiple organization, from public to private, recognize that 21st century competencies and frameworks have a place in the educational setting (Adams Becker et al., 2016; Hilton, 2015; Johnson, 2009; P21, 2016; Sharkey & O'Connor, 2013; Voogt et al., 2013). The disconnect exists in the implementation and priority of identified aptitudes along with what effect targeted skills should have on current classroom practices (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). In the field of education, 21st century proficiencies and core subjects are debated as two separate conversations (Sharkey & O'Connor, 2013; Voogt et al., 2013). Instruction that incorporates both 21st century skills and essential content areas must be implemented (Adams Becker et al., 2016; Bishop & Counihan, 2018; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014; P21, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). The same should be said for digital literacy. Although the value placed on producing students who are digitally literate needs to become a priority, digital literacy should

not be seen or isolated as a separate skill set (Bishop & Counihan, 2018; Henriksen et al., 2016; Pahomov, 2014; P21, 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). Applying multiple disciplines, digital literacy skills should be taught using a cross-curricular approach to instruction (Adams Becker et al., 2016; Hilton, 2015; Johnson, 2009; P21, 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013).

Several of the well-known frameworks agree that the developed and identified 21st century competencies needed by today's students will call for more than what has traditionally been found in the American educational setting (Hilton, 2015; Voogt et al., 2013). Many 21st century skills entail social practices that require a process, ones that can be obtained in informal surroundings as well as the formal environment of school (Ellis, 2012; Horn et al., 2015; Voogt et al., 2013). The promoting of 21st century skills can be implemented into the practices and procedures of an educational ecosystem, embedded in the school's structures and routines, curriculum, and instruction, and offered enrichment programs and activities (Ellis, 2012; Horn et al., 2015; Jacobson-Lundeberg, 2016). The role students play within the structure and routines of the school is foundational (Buchanan et al., 2016; Ellis, 2012; Evans & Boucher, 2015; Gillard et al., 2015; Gordy, Jones, & Bailey, 2018; Horn et al., 2015; Pahomov, 2014; Saeki & Quirk, 2015). To support the implementation and attainment of needed 21st century skills, a school's routines and procedures must exhibit an expectancy of students to display personal leadership, choice, problem-solving skills, communication and collaborative abilities, creativity, and independence (Ellis, 2012; Horn et al., 2015; Johnson, 2009; P21, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Curriculum, instruction, and assessment are three areas that must be reevaluated as schools look to encourage and facilitate student proficiency in 21st century skills (Alkharusi et

al., 2014; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Horn et al., 2015; Voogt et al., 2013). While the focus may vary, leading models for 21st century competencies involve thematic curriculum and instruction, project or problem-based learning, and an innovation infused learning environment. These teacher-crafted learning designs support and create authentic, real-world, hands-on, open-ended experiences, helping students develop global and civic mindedness (Ellis, 2012; Horn et al., 2015; Hilton, 2015, Pahomov, 2014; P21, 2015). The onset of a 21st century skillset compels schools to acquire ways to accurately assess student learning (Ellis, 2012; Henriksen et al., 2016; Horn et al., 2015; Koh et al., 2012; Vander Ark, 2018; Voogt et al., 2013). Assessments should allow educators to see the whole picture of a student rather than single aspects of learning (Ellis, 2012; Henriksen et al., 2016; Koh et al., 2012; Voogt et al., 2013). Multiple measures should be constructed and instituted to ensure proper measurement of academic measures as well as a student's interpersonal skills, process and thinking abilities, and the capacity to collaborate and communicate with others (Ellis, 2012; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013).

Schools can encourage, stimulate, and drive student success through authentic, valuable, autonomous, personalized, interest-based experiences (Assor et al., 2002; Buchanan et al., 2016; Ellis, 2012; Evans & Boucher, 2015; Horn et al., 2015; Saeki & Quirk, 2015; Sharkey & O'Connor, 2013). Learners exposed to increased autonomy and self-regulation during instruction experience an increase in both student motivation and scholastic outcomes (Buchanan et al., 2016; Crow, 2009; Thompson & Beymer, 2015; Wang & Eccles, 2013). The traditional structure of schools does little to empower students as it is based around efficiency and standardization, with most assignments using identical content and expecting identical products from students. Doing so does not develop or convey belief in the talents of individual students (Hilton, 2015;

Horn et al., 2015; Pahomov, 2014; Voogt et al., 2013; Wagner, 2012). A learning environment that facilitates student choice and personalized learning, with intentional focus on empowering students through relevant learning experiences, will innately create an environment that shows care and concern around individual student needs and interests (Couros, 2015; Ellis, 2012; Ely, Ainley, & Pearce, 2013; Horn et al., 2015; Pahomov, 2014; Pulfrey, Darnon, & Butera, 2013; Zhao, 2015).

The function of student choice and self-regulation focuses firmly on the student's autonomy and intrinsic motivation (Evans & Boucher, 2015; Núñez & León, 2015; Thompson & Beymer, 2015). If applied to instructional practice, it impresses upon educators to implement autonomous structures into their instruction by offering student-centered experiences such as individualized goal setting stemming from personalized interest and needs and choices regarding relevant learning activities and completion of tasks (Evans & Boucher, 2015; Flowerday & Schraw, 2003; Núñez & León, 2015; Thompson & Beymer, 2015). The concepts of student choice and student autonomy are highly reflected in 21st century frameworks as well (Hilton, 2015; Horn et al., 2015; Trilling & Fadel, 2012). Attributes such as self-directedness, student agency and ownership, judgment and decision making capabilities, management of goals and time, and displaying initiative and self-direction all call for opportunities for student-centered approaches of instruction (Hilton, 2015; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). Devices make this type of ownership possible. No longer the content keeper, teachers must embrace a collaborative learning space where, instead of being the content expert in the room, they are the metacognitive expert with the tools needed to initiate and provoke inquiry (Aslan & Reigeluth, 2013; Ellis, 2012; Gillard et al., 2015; Pahomov, 2014; Vander Ark, 2018).

The inclusion of digital and informational literacy as an essential student skill places another educational demand on schools (Adams Becker et al., 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014; P21, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). Technology integration must be purposeful, designed to support instructional outcomes, contribute to student understanding at deeper levels, and encourage authentic assessment through evidencing critical and creative thinking over mastery of content (Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Vander Ark, 2018; Voogt et al., 2013). Educators need to specifically address this need by offering students the instructional tools required to support autonomous instructional practices in the classroom (Aslan & Reigeluth, 2013; Evans & Boucher, 2015; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013).

Research Questions

The intent of this study was to construct questions that contribute to a lack of research that exists regarding influences and integration of 21st century skills in the elementary school setting (Creswell, 2015). There is little question among educational stakeholders about the necessity to integrate 21st century skills into the current educational system (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Carver, 2016; Ellis, 2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2016; Trilling & Fadel, 2012; Voogt et al., 2013). However, disagreements remain concerning what 21st century practices are most beneficial to today's student's success and how to deliberately incorporate various strategies into the instructional setting (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). The research questions for this study include:

1. How does self-selected technology choice impact students' perceptions of student-centered assessments?

2. What are students' perceptions of choice in evidencing their learning using technology-based platforms?

3. When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?

4. Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?

Description of Terms

Educators recognize the power of shared, common language (Boogren & Marzano, 2015; Smith, 2015). When discussing the educational environment and instructional practices, a mutual understanding of critical terms is fundamental (Boogren & Marzano, 2015; Smith, 2015). The explicit definitions and identification of specific terms related to the study will aid in contributing to the shared understanding of research and its findings (Creswell, 2015). The subsequent terms and definitions were recognized and established to add context and understanding throughout this research:

1:1 learning environment. The term 1:1 is used to describe a specific learning environment involving the use of educational technology such as a laptop, netbook, tablet, or mobile learning device. This ratio signifies that one device is available for every one student in the classroom (Great Schools Partnership, 2013).

21st century skills or 21st century competencies. These terms refer to the knowledge, skills, and attitudes identified for successfully living and working in a 21st century society (Voogt et al., 2013). These competencies include complex problem solving and critical thinking skills, flexibility and adaptability, advanced technical aptitudes, the ability to communicate effectively, and highly developed collaborative skills (P21, 2015; Sullivan & Downey, 2015).

Authentic assessment. Authentic assessment emphasizes student-driven knowledge construction, complex thinking and problem solving skills, as well as effective communication surrounding an authentic real-world context (Koh et al., 2012)**.**

Autonomous instructional supports or practices. Autonomous instructional supports or practices encourage student choice, decision-making, and self-reflection. Assessments in this learning environment empower students to provide multiple perspectives and solutions to proposed content. Autonomous instructional supports and practices encourage student motivation, positive emotions and satisfaction of students, perseverance, deeper learning, and improved retention and understanding of outcomes (Buchanan et al., 2016).

Critical thinking skills. Critical thinking is the ability to actively and skillfully conceptualize, apply, analyze, synthesize, or evaluate content that is observed, experienced, reflected upon, reasoned, and communicated to form and/or support beliefs and actions (Foundation for Critical Thinking, 2015).

Deeper learning competencies. Deeper learning is a term for the skills and knowledge identified as needed to thrive in 21st century society and job market. The competencies ensure that students will master core academic knowledge and have the ability to apply content to authentic situations and/or context. Deeper Learning Competencies include: mastery of core academic content, critical thinking and problem solving of multifaceted problems, the ability to work collaboratively with others, self-directed learning skills, and the development of academic mindsets (Deeper Learning Competencies, 2013).

Digital literacy. Digital literacy is one's fluency to use digital technology, communication features, or networks to research, assess, apply, and construct information. This skill extends to a person's capacity to comprehend and use content in various formats from

diverse sources on digital devices. Digital literacy includes the skills needed to successfully complete tasks in a digital environment, including the ability to understand and decipher media content, analyze and produce data with images that accurately communicate findings, and assess and apply content knowledge retrieved in digital environments (University of Illinois, 2008).

Educational technology integration. Applicable educational integration of technology occurs when educators see technology as a support to instructional design. The technology approaches used by an educator should enhance student outcomes, advance student's understanding, and provide purpose to the overall learning activity (Sharkey & O'Connor, 2013).

Information literacy. Informational literacy is the acknowledgement that information and technology are no longer stand-alone entities. Instead, information literacy supports the concept that information and technology are indissolubly linked (Sharkey & O'Connor, 2013).

Mastery-based/competency-based learning. Sometimes referred to as performance-based or individualized learning, mastery-based/competency-based learning is student-centered and standards-based. Assessments in this learning environment have intentional variety and are designed to exhibit an authentic application of student's content understanding and proficiencies. Assessments can be anything from smaller, more succinct activities to longer multi-faceted tasks that require academic stamina (Sullivan & Downey, 2015).

Media literacy. Media literacy is a necessary skill of 21st century students that focuses on offering learners a process to access, analyze, evaluate, create, and participate in digital media through a variety of formats. This required literacy is recognized as a prerequisite skill of citizenship, enabling an individual to effectively seek information and communicate in today's world (Center for Media Literacy, 2015).

P21 framework for 21st century learning. In collaboration with multiple educational stakeholders (business, education, government, etc.), the P21 Framework for 21st Century Learning was established to serve as a guide for educational institutions wishing to design and promote relevant learning environments that include the rigorous student outcomes needed in a 21st century society (P21, 2015; Trilling & Fadel, 2012).

Performance-based assessment. Performance-based assessments result in a "tangible product" designed to engage students in the demonstration and application of knowledge centered around higher order and cross discipline learning (Noguera, Darling-Hammond, & Friedlaender, 2015).

Personalized learning. Personalized learning is designed to meet each student's strengths, needs, and interests. A personalized learning environment allows for student voice and choice in content in addition to access to anytime, anywhere learning. Personalized learning models are adaptive and must support student mastery of content, provide flexible learning spaces, intentional development of community partnerships, purposeful variety in instruction, and access to multiple resources and modalities of learning (Abel, 2016).

Self-regulated learner. A self-regulated learner is an active learner, assembling knowledge using multiple metacognitive approaches to monitor and reflect on their academic learning. Students who self-regulate are introspective of assignment requirements as well as individual and/or specific needs to enhance their learning experience. To a self-regulated learner, the experience of learning is a controllable one, employing specific strategies such as consistent planning, organizing, monitoring, and evaluating of their personal learning process (Mega, Ronconi, & De Beni, 2014).

Student-centered assessment. Student-centered or learner-centered assessments are designed to allow for student engagement and choice through research, exploration, experimentation, collaboration, and use of imagination resulting in student-driven knowledge construction, complex thinking, and strategic problem solving. Student or learner-centered assessments result in authentic, relevant work, as well as develop effective communication skills needed in authentic, real-world contexts (Buchanan et al., 2016; Koh et al., 2012).

Student-centered or learner-centered education. Student-centered or learner centered educational methods allow students to research, explore, experiment, collaborate, make choices, and use their imaginations, actively engaging them in authentic, relevant work (Buchanan et al., 2016). Specific learning models associated with student-centered or learner-centered education include, but are not limited to, Inquiry-Based Learning, Project-Based Learning, Problem-Based Learning, Passion-Based Learning and Genius Hours (Buchanan et al., 2016).

Student choice. Promoting student motivation and deep learning experiences through the offering of meaningful and relevant choices in the classroom setting (Evans & Boucher, 2015). Student choice in the classroom can involve multiple options from accessing content information, expressing or evidencing content knowledge, individualized-goal setting, student interest content opportunities, to student driven decision making opportunities regarding the overall learning environment (Evans & Boucher, 2015; Koh, 2016).

Technology-based platforms. For the purpose of this study, a technology-based platform refers to any software, web 2.0 (browser-based) or app-based, utilized on an electronic device such as a mobile device, laptop, tablet, etc. in the classroom setting for the purpose of learning or demonstrating knowledge.

Significance of the Study

The number of schools initiating plans to incorporate innovative instructional practices continues to increase (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis, 2012; Horn et al., 2015; Sharkey & O'Connor, 2013; iNACOL, 2015a). This research contributes to the emerging knowledge surrounding effective, innovative strategies in education. With the discrepancy in how specific 21st century skills can effectively be implemented into the educational environment, there is a need for further research that investigates and establishes best practices in this field (Adams Becker et al., 2016; Ellis, 2012; Faulkner & Latham, 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Among identified 21st century skills are the need for students to display strengths in problem-solving competencies, effective communication, and collaboration, as well as creativity and innovation (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015, iNACOL, 2015a; Johnson, 2009; P21, 2016). Specific attention to multiple literacies has also been noted, including informational literacy and digital literacy (Adams Becker et al., 2016; Bishop & Counihan, 2018; Hilton, 2015; Horn et al., 2015, Johnson, 2009; P21, 2016). Research shows that learners exposed to classroom strategies that focus on autonomy and self-regulation during instruction will demonstrate growth in both student motivation and scholastic outcomes (Buchanan et al., 2016; Crow, 2009; Thompson & Beymer, 2015; Wang & Eccles, 2013). These strategies successfully implemented into classroom practice ensure a student-centered environment, involving individualized goal setting, student inquiries based around personalized interest and needs, and student voice in relevant, real-life learning opportunities (Evans & Boucher, 2015; Pahomov, 2014; Núñez & León, 2015; Thompson & Beymer, 2015).

Changes from an industrialized to a globalized society necessitates that schools address the altering needs of the current culture, ensuring students can be successful (Bishop & Counihan, 2018; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Pahomov, 2014; P21, 2015; Trilling & Fadel, 2012; Voogt et al., 2013, Wagner, 2012). Therefore, investigating educational practices that compel these required instructional shifts will contribute to the developing professional knowledge surrounding this innovative educational frontier. Research in this area may benefit multiple educational stakeholders. Educational policymakers as well as state departments of education may profit from this study, using the results to influence not only budgetary decisions involving infrastructure and educational technology, but also to address policy surrounding instructional practice and educational design. Furthermore, districts, schools, and individual educators may reflect on this study's findings when looking to incorporate pedagogical practices that impact students' futures. Finding structures that support an increase in student engagement at the elementary level has profound implications on the outlook of a child's overall success (Ladd & Dinella, 2009; Upadyaya & Salmela-Aro, 2013). Furthermore, educators need to better identify the practices that advance and cultivate the needed 21st century skills of students.

Theoretical Framework

While a conceptual framework has been explained to provide the "what" of a particular study, an identified theoretical framework refines the study by illuminating the "why" and the "how" (Ravitch & Riggan, 2016). For this study, the Partnership for 21st Century Skill's *P21 Framework for 21st Century Learning* was established as the theoretical framework (P21, 2016; Trilling & Fadel, 2012). This theoretical framework provided a compass for inquiry and coherence to the study's research design, methodology, data analysis, and conclusions regarding

student perceptions surrounding choice and autonomy in evidencing learning during student-centered assessments using self-selected technology-based platforms among upper elementary students.

The Partnership for 21st Century Skills (P21) did not happen by accident (Trilling & Fadel, 2012). It was the intentional focus and cooperation of dedicated educators, business men/women, and policymakers that consistently pushed the need for and importance of integrating 21st century skills into the current educational structure (P21, 2016; Trilling & Fadel, 2012). From global high-tech leaders to both profit and non-profit trailblazer organizations in the educational arena, P21 collaborators banded together to design and advocate for innovative approaches to teaching and learning across elementary and secondary schools (P21, 2016; Trilling & Fadel, 2012; Wigner, 2017).

P21 gained momentum in 2007 when it conducted a nationwide survey which revealed that the majority of voters found significant value in recognized 21st century skills such as critical thinking, problem solving, computer-technology skills, and the ability to effectively communicate and be self-directed (Trilling & Fadel, 2012). These substantial findings not only influenced national educational agendas and policy, but also encouraged the participation of multiple states to set 21st century goals in the areas of student learning, professional development of educators, curriculum and instruction, standards and assessments, and evaluation of learning environments. P21's original emphasis was the American educational system, but the organization quickly found their message resonated beyond U.S. borders, finding like-minded advocates in international associations (P21, 2016; Trilling & Fadel, 2012).

The appeal of P21's Framework for 21st Century Learning comes from its transparency and articulation for what 21st century learning is and can be within the educational structure

(Trilling & Fadel, 2012). Despite the multiple studies devised to identify proficiencies essential to thrive in an ever-changing global society, there is lack of consensus when it comes to what those essential skills are or how to effectively develop 21st century skill sets in our students (Hilton, 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). With the collaborative touchpoints of education, business, and government stakeholders, the P21 Framework for 21st Century Learning has created a structure for educational institutions wishing to design relevant learning environments that include the rigorous student outcomes needed for current society (P21, 2015; Trilling & Fadel, 2012). The framework highlights the need for student's knowledge of core subjects, interdisciplinary engagement with 21st century learning themes, learning and innovation skills, understanding of 21st century literacies, and the necessity of life and career skills (P21, 2015; Trilling & Fadel, 2012).

Overview of Research Methods

This mixed methods study used an explanatory sequential design. Explanatory sequential design investigates both quantitative and qualitative aspects to a study providing benefits to both the researcher and intended audience (Creswell, 2015; Ivankova, Creswell, & Stick, 2006). The strength of explanatory sequential research design lies in a set duel collection process and examination of both quantitative and qualitative data, supplying the researcher a richer comprehension of the presented research questions (Creswell, 2015; Ivankova et al., 2006). Although explanatory research design analyzes both forms of data, it does so in a purposeful sequenced manner, first by the collection and examination of quantitative data, then using qualitative data to illuminate the quantitative results (Creswell, 2015).

To effectively answer the proposed research questions of this study, quantitative data was first gathered and assessed through the use of a Likert scale survey instrument. The survey

focused on collecting initial results regarding student perceptions of choice and autonomy, teacher driven vs. student driven assessments, and ability in self-selecting technology-based platforms for use on student-driven assessments. Survey data was analyzed to identify areas of emphasis for the qualitative portion of this study. The collection of qualitative data served to provide increased knowledge and understanding of the initial quantitative findings and aligned with the data collection process of explanatory sequential design (Creswell, 2015). Driven by the quantitative findings, qualitative data was then collected by means of student peer semi-structured focus groups. The use of focus groups allowed the researcher to gain lived insights into student perception and reasoning with respect to student choice and autonomy in self-selecting technology-based platforms to evidence learning (Creswell, 2015; Marshall & Rossman, 2015). Data was assessed to identify themes that may add to educators' understanding and clarity of student perceptions surrounding choice and autonomy, student-centered assessments, and the integration of 21st century skills among upper elementary students.

Chapter II

Review of Literature

Introduction

Among the challenges facing the current educational system is the misalignment transpiring between the prevailing educational structure and meeting the needs and demands of current society (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Johnson, 2009; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012). Competencies identified as 21st century skills have been recognized by various models and highlight not only aptitudes in technology, media, and 21st century literacies, but also include mastery of core subject areas, creativity, critical thinking skills, and the ability to innovate and problem solve, self-direct, and collaborate with others (Aslan & Reigeluth, 2013; Ellis, 2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2015; Trilling & Fadel, 2012; Voogt et al., 2013; Wagner, 2012). Effective integration of acknowledged 21st century skills will demand shifts in educational policy, curriculum, and instruction, as well as assessment practices all focused on re-visioning research-based instructional practices and providing student-centered learning environments (Adams Becker et al., 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013). While most leaders in education agree on the need for targeted 21st century competencies, the divergence of thinking comes in how schools will implement these into curriculum (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Curriculum, instruction, and assessment that supports the acquisition of both 21st century skills and mastery of essential content must be introduced (Adams Becker et al., 2016; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Mitchell et al., 2010; Pahomov,

2014; P21 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013; Wright & Jones, 2018). A 21st century learning environment calls for authentic assessment, transparent in nature with mastery-based objectives and criterion referenced skills that allow for student ownership and engagement in evidencing learning (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Horn et al., 2015; Houser, & Frymier, 2009; Sharkey & O'Connor, 2013). With recognized proficiencies such as self-directedness, student agency and ownership, judgment and decision making capabilities, management of goals and time, and displaying initiative and self-direction, using student choice and autonomous instructional supports has its place in the 21st century classroom (Hilton, 2015; Horn et al., 2015; Pahomov, 2014; P21, 2015; Trilling & Fadel, 2012). By explicitly presenting learners with instructional tools that support autonomous instructional practices, students can begin self-selecting resources that support various learning objectives and identifying technology as a device that emboldens them as they learn and process information (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Evans & Boucher, 2015; Henriksen et al., 2016; Horn et al., 2015; Pahomov, 2014; Trilling & Fadel, 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013).

The purpose of this mixed methods study is to identify and explore upper elementary student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms. The literature review will offer comprehensive information as it relates to assessment and student choice, including student choice of technology-based platforms or applications to evidence learning. Students' choice in assessment using self-selected technology-based platforms or applications will be examined by further exploring the following: 1) P21's Framework for 21st Century Learning, 2) influencing student motivation and engagement through student choice, 3) authentic assessment, 4) a

society's call for 21st century skills, 5) the American classroom, then and now, and 6) technology in the classroom. The focus and extent of this review will provide understanding and background of current research available, including identified gaps in research validating the need for this study.

Theoretical Framework: P21 Framework for 21st Century Learning

The P21 Framework for 21st Century Learning was developed by the Partnership for 21st Century Learning (P21) in 2002. This alliance brought together multiple levels of education stakeholders, including community business leaders, educational leaders, and key policymakers to draw awareness to, and begin to focus national attention on, the need for student capacity in 21st century skills (Bradley, 2016; Hilton, 2015; Johnson, 2009; P21, 2015; Trilling & Fadel, 2012; Wigner, 2017). Since their formation, P21 has become a leading voice for 21st Century Education, partnering with other non-profits and corporate businesses who are like-minded to their cause, including the following entities: U.S. Department of Education, Apple, Microsoft, The Walt Disney Company, Ford Motors, First Five Years Fund, National Board for Professional Teaching Standards, Fisher-Price, National Education Association, PBS, and many more (Johnson, 2009; P21, 2016; Trilling & Fadel, 2012).

Acting on the same shared mission and vision, P21 vigorously seeks to shape policy at all levels and face the difficulties of leading 21st century readiness for all students (P21, 2007; Trilling & Fadel, 2012). This purposeful undertaking is clearly established in P21's mission and vision statement.

P21's mission is to serve as a catalyst for 21st century learning to build collaborative partnerships among education, business, community and government leaders so that all

learners acquire the knowledge and skills they need to thrive in a world where change is

constant, and learning never stops. (P21, 2007, P21 Vison and Mission, Para. 1).

P21 collaborators embody over 5 million members in the current global economy and take

seriously the task of providing learning experiences that translate to student success in the

current global and digital society. P21 believes these vital learning experience must take place in

and out of the classroom setting, and occur from cradle to career (Bradley, 2016; Hilton, 2015;

Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012).

The P21 Framework for 21st Century Learning pushes instruction and learning past mere

content knowledge of conventional assessments of quizzes and test, asking for students to deepen

content knowledge while also gaining the skills needed for 21st century success (Bradley, 2016;

P21, 2017; Trilling & Fadel, 2012; Wigner, 2017). The P21 Framework for 21st Century

Learning includes a 21st Century Knowledge-and-Skills Rainbow which comprises half of the

learning framework (P21, 2016; Trilling & Fadel, 2012; Wigner, 2017). The 21st Century

Knowledge-and-Skills Rainbow demonstrates P21's focus on the inclusion of traditional school

subjects such as the 3R's (reading, writing, and arithmetic), but extends to include other core

subjects of world languages, economics, science, government, and arts. The P21 Framework

incorporates current interdisciplinary themes and identified 21st century skills as a backbone for

instructing tradition core subjects. Recognizing the world our present students are living in and

entering, the P21 Framework for Learning highlights the need for relevant issues, problems, and

topics to be addressed in the curriculum such as global awareness, environmental literacy,

financial literacy, health literacy, and civic literacy (Bradley, 2016; P21, 2016; Trilling & Fadel,

2012). These themes, along with core content, are then taught under the umbrella of the key

skills identified as most in demand for 21st century citizens, learning and innovation skills,

information, media, and technology skills, and life and career skills (Ellis, 2012; Horn et al., 2015; Hilton, 2015, Pahomov, 2014; P21, 2015, Trilling & Fadel, 2012).

Today's knowledge-aged society is compelling a workforce that needs to think critically, communicate, create, and innovatively apply new knowledge (Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2015; Trilling & Fadel, 2012; Voogt et al., 2013). For that reason, P21's Framework for 21st Century Learning emphasizes these abilities as the 4C's of 21st Century Skills: Critical Thinking and Problem Solving, Communication and Collaboration, and Creativity and Innovation. All are considered foundational cornerstones to creating students who become autonomous, successful, life-long learners (P21, 2015; Trilling & Fadel, 2012; Wigner, 2017). Educators must design learning experiences in such a way that it prolongs and deepens the level at which students engage and apply content (Horn et al., 2015; Pahomov, 2014; P21, 2015; Trilling & Fadel, 2012). Engaging students in critical thinking and problem solving skills requires a learning activity that asks students to reason effectively, use systems thinking, make judgements and decisions, and solve problems (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014; P21, 2015; Trilling & Fadel, 2012; Sharkey & O'Connor, 2013; Wright & Jones, 2018). Building these types of skills in students requires opportunities to draw and defend personal conclusions, necessitating that students evaluate, analyze, and synthesize credible information, apply conclusions, and communicate solutions to an audience (Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). The technologies of the current day only extend this process, allowing for student ownership of research, student management and organization, and extension of student resources such as online experts and websites (Couros, 2015; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012).

While on some level communication has always been a priority of the traditional educational system, it has fallen into the teaching of grammatical usage, reading fluency, and writing skills (Trilling & Fadel, 2012). The present technology-driven and connected society requires a broader scope of communication, including one's ability to efficiently communicate using technology-based tools and software, and a person's effectiveness to collaborate with others (Adams Becker et al., 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014; P21, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). With a global economy that is consistently striving for enhanced services, developments, and products, it only stands to reason that creativity and innovation are demanded traits and skills for 21st century success (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015; iNACOL, 2015a; Johnson, 2009; P21, 2015; Trilling & Fadel, 2012). Instead of rote memorization, basic skills, and facts, P21 Framework for 21st Learning is placing priority on fostering creativity and innovation. Creativity and innovation is for all students (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; P21, 2015; Trilling & Fadel, 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). Despite a student's cultural background, intellectual capacity, or economic background, an imagination and a student's ability to create is innate in all of us with no bounds or age limit (Trilling & Fadel, 2012). Creativity and innovation, like any other skill, can be fostered and developed in an environment that allows for questioning, the input of new ideas, trust, and the acceptance of failure as a part of the learning cycle (P21, 2015; Trilling & Fadel, 2012). As seen in Figure 1, P21 places the development of the 4C's, creativity and innovation, critical thinking and problem solving, as well as communication and collaboration, as a hallmark of their framework. (P21, 2016; Trilling & Fadel, 2012; Wigner, 2017).

Figure 1

P21: The 4C's of Learning and Innovation

Note: Adapted from by *Framework for 21ˢᵗ Century Learning*, Retrieved from
http://www.p21.org/about-us/p21-framework, Copyright 2015 by Partnership for 21ˢᵗ Century
Learning. Adapted with permission.

      In the social context of today's media, students must have the skills to decipher the

pervasive amounts of information readily accessible to them (Adams Becker et al., 2016; Hilton,

2015; Horn et al., 2015; P21, 2016; Trilling & Fadel, 2012). Beyond deciphering, students today

need to know how to appropriately and effectively access, evaluate, use, manage, and contribute

to the vast data added to the communal pool of knowledge that increases by the second (Couros,

2015; Horn et al., 2015; Lemley, Schumacher, & Vesey, 2014; P21, 2016; Trilling & Fadel,

2012; Sharkey & O'Connor, 2013). The access and availability of increased technology allows

for today's students to magnify their thinking and learning in ways never seen before (Couros,

2015; Horn et al., 2015; P21, 2016; Trilling & Fadel, 2012). Along with that is the challenge of

students learning to manage amounts of information on a level that is unlike any other time in history. This scenario in current society calls for students to have new and varied literacies including information literacy, media literacy, and information and communication technology literacy (Bishop & Counihan, 2018; P21, 2015; Trilling & Fadel, 2012).

Information literacy is a student's capacity to access information efficiently and effectively, evaluate information critically and competently, and use information accurately and creativity (Hilton, 2015; Sharkey & O'Connor, 2013; P21, 2015; Trilling & Fadel, 2012). The defined skills for 21st century digital literacy highlight the importance of a student's ability to not only evaluate and access information, but also to apply and manage the gathered information (Aslan & Reigeluth, 2013; Couros, 2015; Horn et al., 2015; Lemley et al., 2014; P21, 2015; Trilling & Fadel, 2012; Sharkey & O'Connor, 2013). Media literacy refers to a student's capacity to understand and use 21st century media and technology tools to effectively, efficiently, and creatively construct products that communicate individual concepts and ideas across various contexts (Center for Media Literacy, 2015; P21, 2015; Trilling & Fadel, 2012). Information and communication technologies (ICTs) literacy involves a student's mastering of 21st century tools under the context of learning (P21, 2015; Trilling & Fadel, 2012). Student ability to both analyze media and create media products is essential to empower students and allow them to effectively contribute in current and future society (Bishop & Counihan, 2018; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). ICT Literacy is not always about teaching technology fluency, but about using and applying appropriate technology-based tools to deepen and create authentic real-world learning (Couros, 2015; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). Figure 2 frames the importance each of the multiple literacies affords today's students.

Figure 2

P21: Essential 21ˢᵗ Century Literacies
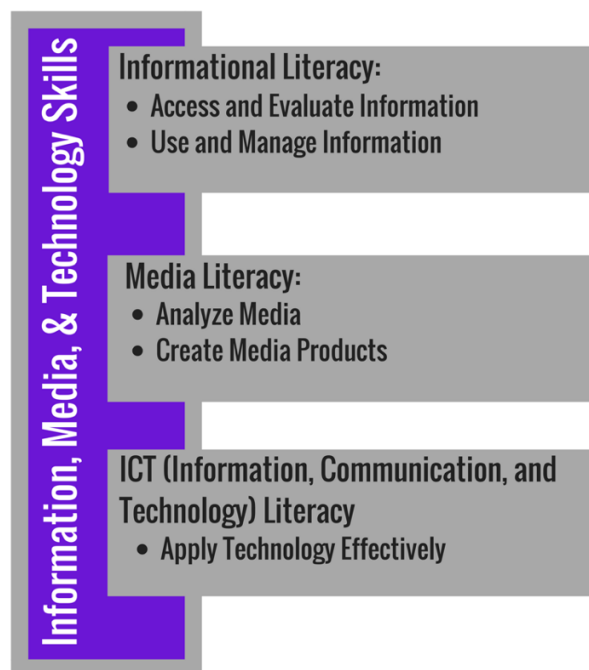
Note: Adapted from by *Framework for 21ˢᵗ Century Learning*, Retrieved from http://www.p21.org/about-us/p21-framework, Copyright 2015 by Partnership for 21ˢᵗ Century Learning. Adapted with permission.

Developing the career and life skills of today's students cannot be ignored (P21, 2015; Trilling & Fadel, 2012). With both performance-based and skills-based criterions being the norm in many industries to assess one's employability, recognizing and building capacity of identified 21ˢᵗ century soft skills is a basic need for all students, and is therefore highlighted in the P21's Framework for Learning (Aslan & Reigeluth, 2013; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Pahomov, 2014; P21, 2015, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). These recognized life and career skills include flexibility and adaptability skills, initiative and self-direction skills, social and cross-cultural skills, productivity and accountability skills, and leadership and responsibility skills (P21, 2015; Trilling & Fadel, 2012).

In a society experiencing change at such phenomenal rates, flexibility and adaptability are required life skills for today's citizen (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015, Johnson, 2009; P21, 2016; Trilling & Fadel, 2012). New developments demand us to modify the ways in which we communicate, learn, and operate within our world (Aslan & Reigeluth, 2013; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Pahomov, 2014; P21, 2015, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). This climate of constant change requires intention in developing students who can acclimate to multiple positions and varied job skills and responsibilities within multiple timetables and environments (Couros, 2015; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). Furthermore, students must become familiar with both the giving and receiving of positive and constructive feedback in multiple contexts of their lives (Alkharusi et al., 2014; Astuti, 2016; Kim, 2015; Marzano, 2010; P21, 2015; Trilling & Fadel, 2012; Zumbrunn, Marrs, & Mewborn, 2015). Students must be able to weigh personal opinions and beliefs while valuing the diverse outlooks of others, understanding that all viewpoints can be used to work towards an end goal (Trilling & Fadel, 2012).

In a rapid-paced world, time is a hot commodity causing initiative and self-direction to become a valued aptitude in the workplace (Hilton, 2015; Horn et al., 2015; Pahomov, 2014; P21, 2015; Trilling & Fadel, 2012). To prepare our students, the classroom environment of today should include instructions that offers students the opportunities to gain experience in managing personal goals and time, working independently, and being self-directed learners (Assor et al., 2002; Brooks & Young, 2011; Crow, 2009; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). A globalized community calls for a globalized student with perspectives and understandings that affirm cultural and social diversity, who uses that diversity as part of the

solution to tackle issues or problems they may face (P21, 2016; Trilling & Fadel, 2012). The

skills of productivity and accountability have always been valued in the workplace. In this

technology-based workplace, it is the efficiency and the effectiveness of the productivity in

which employees are held more accountable (P21, 2016; Trilling & Fadel, 2012). The 21st

century calls for developed project management skills that produce results, all the while acting

professionally, holding positive and ethical relationships with others, multitasking, collaborating,

and incorporating the diversity of the team. This includes leadership and responsibility skills

with the ability to guide, lead, and be responsible to those with whom you are working (Aslan &

Reigeluth, 2013; Buchanan et al., 2016; Gillard et al., 2015; Horn et al., 2015; Pahomov, 2014;

Saeki & Quirk, 2015; Trilling & Fadel, 2012; Wagner, 2012). Figure 3 again emphasizes the life

and career skills considered necessary for students into today's workforce.

Figure 3

P21: Recognized Career and Life Skills for the 21st Century

Note: Adapted from by *Framework for 21st Century Learning*, Retrieved from http://www.p21.org/about-us/p21-framework, Copyright 2015 by Partnership for 21st Century Learning. Adapted with permission.

The P21 Framework for 21st Century Learning acknowledges the complexities involved in our educational system today (Aslan & Reigeluth, 2013; DuFour, 2006; Henriksen et al., 2016; Horn et al., 2015; P21, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013; Trilling & Fadel, 2012). From media, family, community members, policy makers, private business holders, higher education institutions, school board members, teachers, and more, daily interactions and influences between educational and non-educational entities create touchpoints that effect the educational environment of every child (P21, 2015; Trilling & Fadel, 2012). When looking to

support and implement 21st century skills in schools, the P21 Framework recognizes this interlaced system, but aims to simplify how each stakeholder must work together and recognize their role in accomplishing this objective (P21, 2015; Trilling & Fadel, 2012). The P21 Framework for Learning identifies five separate traditional support systems that must shift to support the development of 21st century skills in our schools, standards, assessments, curriculum and instruction, professional development, and learning environments (P21, 2016; Trilling & Fadel, 2012).

P21 has found that achieving the outcomes of the identified support systems in sync takes focus with key attention given to shared vision, coordination, official policy, distributed and coordinated leadership, learning of technology, and emphasis on teacher learning as an integrated part of any successful 21st century initiative (P21, 2015; Trilling & Fadel, 2012). The framework identifies five key support structures of traditional schools that must be revamped and reworked to fully foster the development of 21st century skills in classrooms (P21, 2015; Trilling & Fadel, 2012). Standards that support 21st century learning should focus less on the content a student should know about a subject by a specific age or grade level (Trilling & Fadel, 2012). Instead, the standard should detail what a student should be able to do with specific content, leaning towards application or evidence of learning (Aslan & Reigeluth, 2013; Horn et al., 2015; Lemley et al., 2014; P21, 2015; Trilling & Fadel, 2012).

The area of assessment is paramount in the instructional process (Aslan & Reigeluth, 2013; DuFour, 2006; Koh et al., 2012). It provides data needed for teachers to guide a student's learning path and allows an instrument for student and teacher feedback that is required to meet individual learning targets (Couros, 2015; Curry, Mwavita, Holter, & Harris, 2016; DuFour, 2006; Ellis, 2012; Marzano, 2010; P21, 2015; Trilling & Fadel, 2012). Assessments should

measure the application of the content, be authentic in nature, and be embedded in a variety of ways throughout the learning process (Aslan & Reigeluth, 2013; Curry et al., 2016; DuFour, 2006; Koh et al., 2012; Trilling & Fadel, 2012). To engage and foster 21st century learning skills, curriculum and instruction should include inquiry, design, and collaborative learning projects. Inquiry, design, and project-based instruction can be constructed to meet various standards, deepen academic rigor, and increase student understanding (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis, 2012; Horn et al., 2015; Pahomov, 2014; P21, 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012).

Successful shifts to 21st century schools have included successful professional development programs for educators (Ellis, 2012; Faulkner & Latham, 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sadaf, Newby, & Ertmer, 2016; Sharkey & O'Connor, 2013). For instructional change to happen in the classroom, educators must be supported and provided the educational experiences to prepare them to facilitate 21st century shifts and practices (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015; Trilling & Fadel, 2012). Learning environments play a major function in fostering and sustaining a 21st century learning environment and include more than just the physical space of a building and classroom (Adams Becker et al., 2016; Couros, 2015; Hilton, 2015; Horn et al.; Trilling & Fadel, 2012). The P21 Framework expands the definition of the learning environment to include the school's daily operation, scheduling, courses and activities, the technology infrastructure of the school, the culture of the school's professional community and extended community, and expands to the school's educational leadership and policies (Trilling & Fadel, 2012). Figure 4 displays the full representation of P21's Framework for Learning and its emphasis on the support structures it maintains as critical for a school's successful implementation of 21st century skills.

Figure 4

A Visual Representation of the P21 Framework for 21st Century Learning

P21 Framework for 21st Century Learning
21st Century Student Outcomes and Support Systems
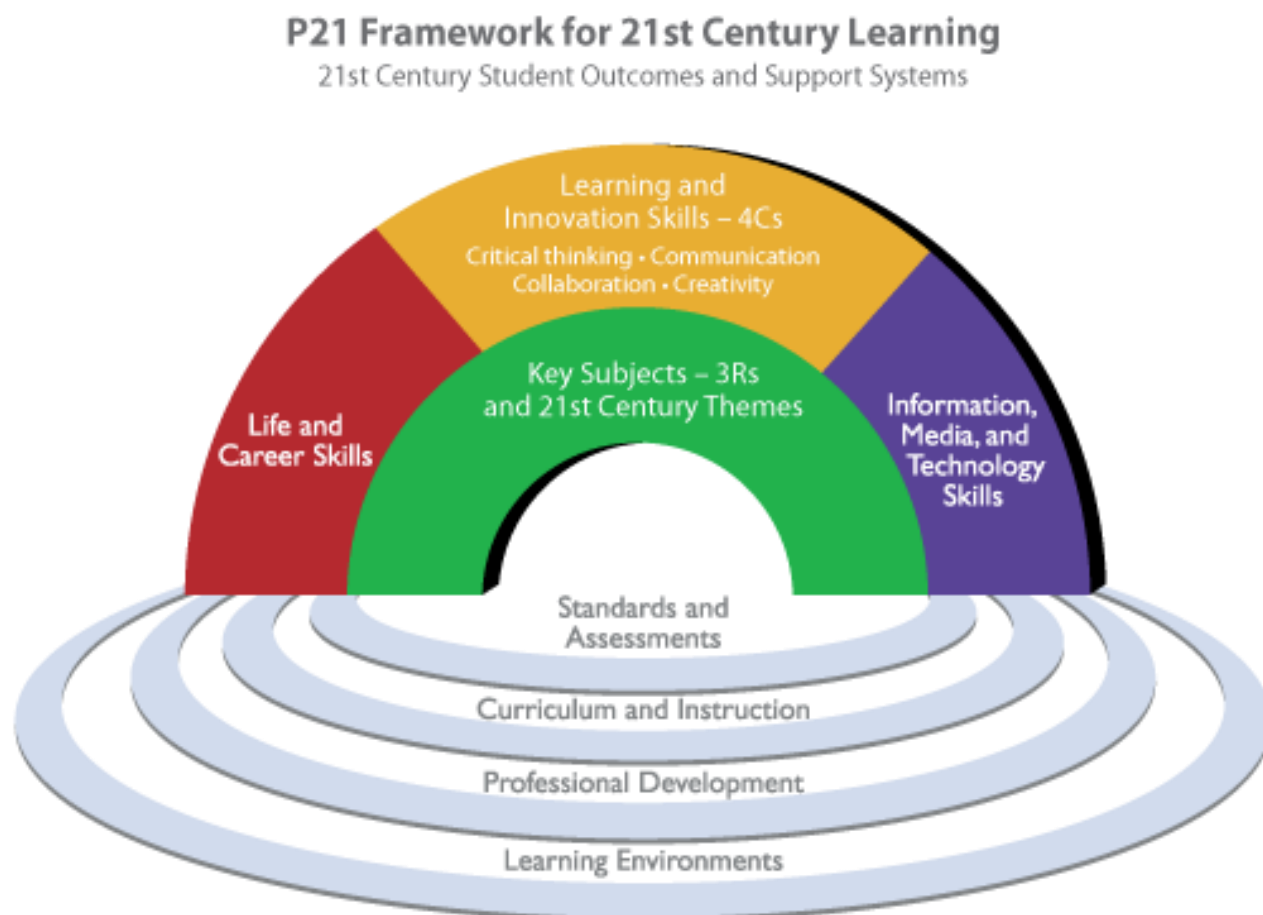
Note: From *Framework for 21st Century Learning*, Retrieved from http://www.p21.org/about-us/p21-framework, Copyright 2015 by Partnership for 21st Century Learning. Reprinted with permission (see Appendix F).

Influencing Student Motivation and Engagement through Student Choice

The academic scoring and grading of students are easily observable and therefore gain a lot of attention, driving educational decisions (Koh et al., 2012; Pulfrey et al., 2013; Saeki & Quirk, 2015). However, the success of students should push past scores and standings, making schools environments of encouragement that promote and believe in student success, providing relevant, valuable, autonomous, personalized, interest-based opportunities (Aslan & Reigeluth,

2013; Couros, 2015; Ellis, 2012; Horn et al., 2015; Koh et al., 2012; Saeki & Quirk, 2015). Often schools try to will student engagement into already established constructs of a building. Instead, schools should be developing new constructs such as educational or instructional practices, school routines and procedures, and content that promotes autonomous learning and student self-efficacy to create and establish an environment of learning (Evans & Boucher, 2015; Horn et al., 2015; Saeki & Quirk, 2015).

Classroom teachers not only face the complexity of teaching students but also how to motivate students to learn (Emo, 2015; Flowerday & Schraw, 2003; Hornstra, Mansfield, van der Veen, Peetsma, & Volman, 2015; Thompson & Beymer, 2015). When decision-making studies often observed in such fields as social psychology, marketing, and business are applied to the context of the educational setting, the results contend that implementing opportunities for student choice in the classroom is a positive practice to adopt (Assor et al., 2002; Crow, 2009; Saeki & Quirk, 2015; Thompson & Beymer, 2015; Wang & Eccles, 2013). In fact, doing so may create mindsets of competence and autonomy in students (Brooks & Young, 2011; Thompson & Beymer, 2015). The role of the classroom environment is significant, affecting not only a student's motivation but also their emotions (Assor et al., 2002; Ellis, 2004; Núñez & León, 2015; Saeki & Quirk, 2015; Wang & Eccles, 2013). The analysis of autonomy support in the classroom revealed that people placed in an environment of decreased autonomy perceive themselves to have little self-choice and reduced initiative. Furthermore, students view their behaviors as direct reactions to internal expectations or outside pressure, such as pressure from others or pressure that is internalized but self-induced (Núñez & León, 2015). Classrooms that address the basic psychological needs of autonomy, competencies, and relatedness will positively impact the well-being of a student (Astuti, 2016; Núñez & León, 2015; Saeki & Quirk,

2015; Wang & Eccles, 2013). Students who feel general competence regarding a specific task are more likely to engage in the task (Caraway, Tucker, Reinke, & Hall, 2003). This increased student self-efficacy can positively influence a student's engagement in the educational setting (Caraway et al., 2003).

For student choice and autonomy supports to work in the classroom effectively, distinctive characteristics must be present (Brooks & Young, 2011; Evans & Boucher, 2015; Núñez & León, 2015; Thompson & Beymer, 2015). Teachers should offer students choice and freedom on performance tasks, making sure to avoid a prescriptive approach and leaving the how and when of the task less defined (Herro & Quigley, 2016; Horn et al., 2015; Pahomov, 2014; Núñez & León, 2015; Thompson & Beymer, 2015). Topics of task also play a vital part in student choice. Topics of tasks should have relevance and connection to the student learner (Couros, 2015; Crow, 2009; Evans & Boucher, 2015; Pahomov, 2014; Schuitema, Peetsma, & van der Veen, 2012; Thompson & Beymer, 2015). Student choice should be proposed in settings that offer value to students (Crow, 2009; Evans & Boucher, 2015; Koh, 2016; Thompson & Beymer, 2015). Special care should be given, ensuring the difficulty of a task is equal to that of the ability of student or classroom. (Marzano, 2010; Thompson & Beymer, 2015).

A teacher's use of autonomous practices, in isolation, does not guarantee motivation. Student perception of practices and classroom culture is vital (Assor et al., 2002; Brooks & Young, 2011; Kim, 2015; Núñez & León, 2015; Wang & Eccles, 2013). Along with autonomous supported instructional practices, there must be a perception among the students that the teacher supports learner autonomy (Brooks & Young, 2011; Kim, 2015; Núñez & León, 2015) Building and maintaining trust between students and educators is fundamental to the classroom learning environment. This trust has an overall academic impact on learners (Astuti, 2016; Houser &

Frymier, 2009; Kim, 2015; Pahomov, 2014; Wang & Eccles, 2013; Zhao, 2015). Interactions

between educators and students, including activities involving discussion strategies and the

intentional incorporation of self-directed learning structures, will directly and positively

influence student learning (Couros, 2015; Kim, 2015)

A student's ability to self-regulate is not exclusive of social economic status or student's

academic ability (Clark, 2012; Crow, 2009). Significant positive correlations exist between a

student's perception of choice, a school's structure, the emotional support of teachers and peers,

and a student's behavioral, emotional, and cognitive engagement (Assor et al., 2002; Brooks &

Young, 2011; Crow, 2009; Núñez & León, 2015; Wang & Eccles, 2013). Students who have

chances during the school day to experience choice express value and relevance in learning

(Ellis, 2012; Horn et al., 2015; Jacobson-Lundeberg, 2016; Pahomov, 2014; Royer, Cantwell, &

Messenger, 2017; Wang & Eccles, 2013). Learners perceive themselves as being in control if

they view the teacher's expectations and actions as foreseeable and the instructional environment

consistent (Brooks & Young, 2011; Núñez & León, 2015; Wang & Eccles, 2013).

Some contend that student choice in collaborative or individualized learning

environments nurtures intrinsic motivation (Brooks & Young, 2011; Buchanan et al., 2016;

Crow, 2009; Deci & Ryan, 2008; Evans & Boucher, 2015; Gillard et al., 2015; Koh, 2016; Royer

et al., 2017). Research affirms evidence that inquiry-based learning, student motivation, and

information literacy result in positive effects on student academic achievement as well as student

outcomes necessary for deeper learning (Buchanan et al., 2016; Clark, 2012; Crow, 2009; Royer

et al., 2017; Sharkey & O'Connor, 2013). Intentional modifications to include autonomous

structures and intrinsic motivational design in the course can lead to student's individual growth

as well (Brooks & Young, 2011; Buchanan et al., 2016; Crow, 2009; Gillard et al., 2015; Kim,

2015; Pahomov, 2014; Royer et al., 2017). Students with autonomy will work more independently to master content than students without (Brooks & Young, 2011; Flowerday & Schraw, 2000, 2003; Gillard et al., 2015). Using a higher education sample, Gillard et al. (2015) reconstructed an existing course to offer elements of student autonomy and choice, including optional attendance, multiple meeting times for face-to-face class, suggested assignment and topic lists to increase individual learning, as well as open due dates on required assignments. The only firm stipulations placed on participating students involved regularly contributing to a class online discussion board and submission of all required coursework by the last day of class (Gillard et al., 2015). Throughout this course, student initiated conversations surrounding content increased, centered around the individual topics and materials students were looking to master. Although attendance was not mandatory, student attendance was maintained or above average, making a student's own engagement or internal motivation the main factor in learning (Gillard et al., 2015).

Students offered choice or taught in an autonomous instructional environment were found to produce more in-depth evidence of task, including increased assignment length and enhanced sustained engagement regarding course matter (Chu, 2009; Gillard et al., 2015; Royer et al., 2017). Student's intrinsic motivation and, subsequently, their task performance increased when extensive choices were offered for task completion (Chu, 2009; Koh, 2016; Royer et al., 2017). Exposure to autonomous design and student choice leads students to perceived feelings of academic rigor and having expanded perspectives (Chu, 2009; Gillard et al., 2015). Students view these opportunities as having value while also providing them an outlet to cultivate and foster unique ideas (Gillard et al., 2015; Herro & Quigley, 2016; Pahomov, 2014).

Student interest, engagement, academic motivation, and achievement are decisively linked to student motivation (Buchanan et al., 2016; Crow, 2009; Thompson & Beymer, 2015). When learners experience increased autonomy and self-regulation of learning, there is an increase of student motivation and positive academic outcomes (Buchanan et al., 2016; Crow, 2009; Flowerday & Schraw, 2000, 2003; Kim, 2015; Koh, 2016; Pahomov, 2014; Royer et al., 2017; Thompson & Beymer, 2015; Wang & Eccles, 2013; Westberg & Leppien, 2018).

Authentic Assessment

Conventional testing that primarily centers on the regurgitation of procedural and fact-driven information has been used to dictate student, teacher, and school proficiency levels for decades (Horn et al., 2015; Koh et al., 2012). Research states, however, that conventional assessments in themselves fail to assess higher-order thinking skills or assess performance of real-world application (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014). Assessment should be a fundamental part of supporting the day-to-day student learning and daily instruction in a classroom (Aslan & Reigeluth, 2013; DuFour, 2006; Koh et al., 2012). Authentic assessments align with the constructivist learning model, encouraging higher-order thinking, conceptual awareness and application, real-world problem-solving strategies, and one's ability to communicate processes and ideas, all of which are identified as skills needed to thrive in the 21st century society (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014; Sharkey & O'Connor, 2013). To fully implement authentic assessment into instruction, teachers must become assessment literate and develop robust measures that provoke higher-order thinking (Curry et al., 2016; Henriksen et al., 2016; Koh et al., 2012; Pahomov, 2014; Spruce & Bol, 2014).

In the right culture, authentic assessments can provide formative data that can effectively be used to influence instruction and define educational goals for students (Aslan & Reigeluth, 2013; Curry et al., 2016; DuFour, 2006; Koh et al., 2012). In developing and using formative data, educators appreciate administrators who support this practice and allow teachers voice and flexibility in the process (Aslan & Reigeluth, 2013; Curry et al., 2016; DuFour, 2006; Ellis, 2012). Educators want to be an active part of the instructional goal setting process and treated as one of the experts in the room (Curry et al., 2016; DuFour, 2006). Transparency is vital in the collaborative use of formative assessment data at all levels of the district (Clark, 2012; Curry et al., 2016; DuFour, 2006; Marzano, 2010; Sharkey & O'Connor, 2013). Open and honest professional discourse, where teachers discuss concerns and engage in active dialogue, leads to targeted conversations regarding student progress and varying approaches to instructional strategies, therefore shaping and informing instructional practice (Couros, 2015; Curry et al., 2016; DuFour, 2006; Ellis, 2012; Marzano, 2010).

Teachers are not the only ones motivated to participate in academic goal setting (Aslan & Reigeluth, 2013; Caraway et al., 2003; Curry et al., 2016; Marzano, 2010). As teachers prove more proficient in goal setting, a common language begins to emerge. This emergence allows academic goal setting to move past the educators into routine practices and procedures of classrooms, motivating students to take ownership of specific learning goals and establishing instructional targets (Caraway et al., 2003; Curry et al., 2016; DuFour, 2006; Marzano, 2010; Núñez & León, 2015; Vaughan, 2014). This sense of community envelopes all stakeholders by actively incorporating parents into the goal setting process and using formative data to nurture parent and school relationships (Aslan & Reigeluth, 2013; Curry et al., 2016). Using formative

data to drive instruction is a skill that must be practiced, mentored, and developed over time (Curry et al., 2016; DuFour, 2006; Koh et al., 2012).

New educational reforms that require students to push beyond factual knowledge into higher-order thinking necessitates a change in how students are assessed (Aslan & Reigeluth, 2013; Cervantes, Hemmer, & Kouzekanani, 2015; Couros, 2015; Ellis, 2012; Grundmeyer, 2015; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012). The literature contends that, to assess our student's higher-order thinking, assessments must change from conventional recall "paper and pencil" assessments to authentic assessments (Couros, 2015; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014). Authentic assessments push students beyond content, driving them to process and construct knowledge using higher-order thinking in a collaborative, problem-based, "authentic" context (Aslan & Reigeluth, 2013; Ellis, 2012; Grundmeyer, 2015; Herro & Quigley, 2016; Horn et al., 2015; Koh et al., 2012). Authentic assessments call for transparency of the thinking process (Clark, 2012; Curry et al., 2016; DuFour, 2006; Houser & Frymier, 2009; Sharkey & O'Connor, 2013). An assessment's transparency can be one of the most prevailing strategies affecting student motivation and achievement (Clark, 2012; Curry et al., 2016; DuFour, 2006; Marzano, 2010). For students to engage with authentic assessment, the evaluation must be multidimensional in nature, valuing multiple areas of a student's development and offering various student-centered opportunities for students to produce or display learning (Cervantes et al., 2015; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Herro & Quigley, 2016; Koh et al., 2012).

Learner-centered environments are another essential component of assessment authenticity (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Couros, 2015; Horn et al., 2015;

Ellis, 2012; Saeki & Quirk, 2015). A mastery-based or criterion-referenced evaluation is critical, allowing students self-direction and an active role in learning (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Herro & Quigley, 2016; Horn et al., 2015; Vaughan, 2014). Along with clarified objectives, assessments that provide real-life application or scenarios deepen student learning and build academic rigor (Alkharusi et al., 2014; Horn et al., 2015; Thompson & Beymer, 2015). Significant findings exist regarding assessments, student performance, and the importance of consistent teacher feedback (Alkharusi et al., 2014; Astuti, 2016; Kim, 2015; Marzano, 2010; Zumbrunn et al., 2015; Vaughan, 2014). Routine feedback from educators produces positive perceptions of assessment tasks and academic self-efficacy in students (Alkharusi et al., 2014; Astuti, 2016; Kim, 2015; Marzano, 2010; Zumbrunn et al., 2015).

Measuring creativity, along with the use of educational technology, requires a change in assessment (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). When assessing creativity, variety and multi-faceted assessments are essential (Ellis, 2012; Henriksen et al., 2016). Teachers need to recognize and understand variation of assessment and how it can be applied within the instructional setting (Ellis, 2012; Henriksen et al., 2016; Koh et al., 2012). It is critical that educators use alternative forms of assessment during instruction, assigning more open-ended tasks that allow students to produce and construct products (Adams Becker et al., 2016; Henriksen et al., 2016; Herro & Quigley, 2016; Horn et al., 2015; Pahomov, 2014; Spruce & Bol, 2014).

A Society's Call for 21st Century Skills

A digital revolution is causing shifts in how the current society learns and will infinitely transform the educational landscape (Adams Becker et al., 2016; Aslan & Reigeluth, 2013;

Couros, 2015; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012). Web-based content has far surpassed the concept of simply offering distance learning programs and has become a catalyst for re-visioning educational models with the ability to personalize instruction and meet the individual needs of students (Couros, 2015; iNACOL, 2015a; Horn et al., 2015; Pahomov, 2014; Vander Ark, 2018). The influence of the digital age doesn't stop there. Online, blended, or technology-rich learning environments are materializing throughout the K-12 instructional setting (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis, 2012; Horn et al., 2015; iNACOL, 2015b; Pahomov, 2014; Sharkey & O'Connor, 2013). Although some would still like to debate the merit of these emerging learning environments, to debate this evolution would be like debating the rise of online or virtual stores, or email versus traditional mail. Even if opinions vary, the convenience, affordability, and access these settings provide in today's society are undeniable (Horn et al., 2015; iNACOL, 2015b; Voogt et al., 2013).

Well over a century ago, only 50% of children ages five to nineteen were enrolled in school (Horn et al., 2015, Rury, 2013). When faced with the demand of educating more students, leaders in the society turned to the innovation of their time, the factory-based system that led to the growth of an industrialized America (Horn et al., 2015; Rury, 2013). The factory-based system focused on standardization and efficiency (Horn et al., 2015, Rury, 2013). The educational reflection of this system resulted in the traditional model still in existence today-students arranged by age and grade levels and taught matching content using similar strategies at the same rate or pace (Horn et al., 2015; Rury, 2013). The fact is, the factory-based approach to education was efficient and adequately prepared students for the industrialized workforce (Aslan & Reigeluth, 2013; Horn et al., 2015, Rury, 2013).

In the 1900's, only 17% of society's workforce was considered knowledge-based workers. Comparatively, our current society demands over 60% of its workforce to be knowledge-based in nature, a 43% increase (Horn et al., 2015). In a culture demanding human potential over industrialized standardization, the factory-based approach to education just isn't enough (Aslan & Reigeluth, 2013; Horn et al., 2015; Wagner, 2012). Despite age, children develop and learn at different rates, have an array of strengths, and bring varied backgrounds and experiences that aid in the learning process (Buchanan et al., 2016; Horn et al., 2015; iNACOL 2015b). Exposing students to repeated content multiple times despite mastery and pushing students through content without obtaining competency are equally detrimental (DuFour, 2006; Horn et al., 2015). School should meet the needs for all students to be successful, but, in an educational system built to standardize and not personalize, this task is at times insurmountable (Aslan & Reigeluth, 2013; DuFour, 2006; Henriksen et al., 2016; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Students entering a knowledge-based workforce need an educational system based on student-centered learning, one that looks to individualize and personalize student education but also ensures that essential competencies and proficiencies are mastered (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis, 2012; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). Student-centered learning ecosystems are reflective of a current culture where systems and technology can rapidly become obsolete. Student-centered learning empowers students by instilling student agency and ownership in the learning process (Aslan & Reigeluth, 2013; Buchanan et al., 2016; Gillard et al., 2015; Horn et al., 2015; Pahomov, 2014; Saeki & Quirk, 2015; Wagner, 2012). Many schools are responding to the need of educational transformation (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Bebell,

2005; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). Traditionally, schools have been an institute of compliance with very few choices or options offered to participating students (Horn et al., 2015; Pahomov, 2014). Content is often based on coverage of material, not interest, limiting the amount of student inquiry facilitated within the classroom setting (Aslan & Reigeluth, 2013; Horn et al., 2015; Pahomov, 2014). Making choices is an authentic part of everyday life; mentoring students through choice-making decisions is not just a good skill, but a foundational life skill to function in the real-world (Couros, 2015; Horn et al., 2015; Pahomov, 2014).

A disconnect is occurring between the current societal needs and the existing educational system (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Johnson, 2009; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wright & Jones, 2018). Historical references are made describing the role industrialization played in shaping the traditional school structure (Aslan & Reigeluth, 2013; Ellis, 2012; Evans & Boucher, 2015; Faulkner & Latham, 2016; Hilton, 2015; Horn et al., 2015). One argument suggests that the information age current society has entered is calling for a new shift involving "learner-centered instruction and learner-centered assessment" (Aslan & Reigeluth, 2013, p.19). This shift mandates a learner-centered approach to instruction that includes a level of personalization where students participate in authentic, cross-curricular learning scenarios that emulate professional careers and real-life contexts (Aslan et al., 2013; Cervantes et al., 2015; Couros, 2015; Ellis, 2012; Faulkner & Latham, 2016; Henriksen et al., 2016; Herro & Quigley, 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012).

The American Classroom: Then and Now

When exploring the traditions and history of American education, one must consider the reciprocal role between education and social change (Grant et al., 2014; Horn et al., 2015; Rury, 2013). It is difficult to clearly separate the blurred lines of influence that run between these two constructs of the country (Rury, 2013). There is no denying that particular instances in the nation's history have shaped and molded the prevailing educational system still in existence today (Horn et al., 2015; Rury, 2013). Also true is the powerful role education has played in familiar social patterns of current society (Horn et al., 2015; Rury, 2013).

Although many would argue that the rate of social change is happening at a faster pace, it is remiss to not consider the advancements and evolutions that have come before, shaping a country and thereby influencing the educational landscape (Horn et al., 2015; Rury, 2013). Education has served as the means of human development, with everyone in the country personally experiencing its role within their lives (Rury, 2013). Education has long been tied to social rule and position, making one's personal experience with education a highly contested and contemplated matter (Rury, 2013). Whether industrialization, urbanization, or globalization, each social dynamic has influenced the educational realm, in turn influencing the lives of its citizens (Grant et al., 2014; Horn et al., 2015; Mabary, 2017; Rury, 2013).

The traditional American classroom. In considering the history of education, one must recognize how schools became what they are today. During the 16th and 17th century, the educational system was not a prominent institution of social structure (Rury, 2013). It was dwarfed in its influence on the established colonies compared to the role of religion and authority of the church (Mabary, 2017; Rury, 2013). Even among colonies where formal education was valued, it was not well attended and limited in who could attend (Rury, 2013). In some colonies,

like New England, formal education was even considered law, but mainly served as a structure to teach religious and social norms of their society (Mabary, 2017; Rury, 2013). These schools were small with approximately 12 students, irregular attendance, and operated by an individual teacher in a one room facility (Rury, 2013). Although present in the colonial society, the impact to the culture was minimal (Rury, 2013).

Even in colonial times, this country was experiencing change (Rury, 2013). The country was in a state of unrest due to incredible growth and two major societal shifts happening in the country, The Great Awakening and a movement known as Enlightenment (Mabary, 2017; Rury, 2013). All three of these influences were a blow to the customary beliefs established among the colonies (Rury, 2013). To live off the land and its natural resources, it was vital to provide for a family's needs through work and trade (Rury, 2013). While educational establishments were still available, formal school was put aside in place of practical education through labor and apprenticeships (Rury, 2013). One of the major educational changes effecting the colonial society came with the revolution during the 18th Century (Mabary, 2017; Rury, 2013). With colonies looking to develop a new nation, the country's leaders recognized how education could be harnessed to establish social change and order (Mabary, 2017; Rury, 2013). This added a significance to education that until this time had not been seen in American history (Mabary, 2017; Rury, 2013). Education became a vehicle to drive political socialization (Rury, 2013). During this period, education began to expand its reach to include women and, in rare cases, people of varying racial minority groups (Rury, 2013).

The 19th century was marked with significant evolutions that greatly impacted the American society and what we know today as the traditional American educational system (Horn et al., 2015; Mabary, 2017; Rury, 2013). As growth of the United States increased across the

continent, the ability to increase communication and transportation also expanded (Rury, 2013).

It was also during this time that states were tasked with forming and maintaining a state

supervised public educational system (Mabary, 2017; Rury, 2013). A boom in manufacturing,

along with the urbanization of parts of the country, brought with it the Industrial Revolution that

dynamically shaped and molded the education system (Horn et al., 2015; Rury, 2013).

The manufacturing powerhouses provided a vibrant model of efficiency, discipline,

orderliness, and standardization that was attractive to educational leadership (Horn et al., 2015;

Rury, 2013). The nation's schools adopted these attributes into their instructional practices,

emphasizing the development of proper habits such as industriousness, responsibility, and order

(Horn et al., 2015; Mabary, 2017; Rury, 2013). This overall learning environment perpetuated

the importance of discipline, self-control, and conformity to societal norms among students

(Horn et al., 2015; Mabary, 2017; Rury, 2013). These properties, mixed with basic academic

skills and changes in structures such as separation of age groups and content disciplines, became

an effective combination for schools as they prepared students for industrial life and order of the

day (Horn et al., 2015; Rury, 2013).

The 21st century classroom. Equipping students with the needed skills for the 21st

Century is an important topic on the minds of policymakers, educational leadership, business

leaders, and community partners (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis,

2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Mitchell et al., 2010; P21, 2016; Sharkey

& O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). In fact, over nineteen states are

joining forces with P21 to bring all educational stakeholders together to permeate 21st century

skills throughout their core curriculums, altering assessments and teaching practices to actively

support the growth of these targeted attributes in their students (Hilton, 2015; Johnson, 2009;

P21, 2015; Trilling & Fadel, 2012). Furthermore, the issue of 21st century learning reaches across party lines, reflective in legislation from the House of Representatives and Senate. In an effort to target the inclusion of 21st century skills in the future renewal of the Elementary and Secondary Education Act, Capitol Hill has sponsored the bipartisan 21st Century Readiness Act (Hilton, 2015; Civic Impulse, 2017).

While much attention has been focused on the importance of 21st century skills, the difficulty comes in the disparity and disagreement regarding what specific skills are considered essential and necessary (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). For instance, the P21 Framework for 21st Century Skills is focused on the 4 C's of innovation and learning (critical thinking, communication, collaboration, and creativity), embedded with life and career skills, multiple literacies (information, media, and technology), and core content (Hilton, 2015; Johnson, 2009; P21, 2015; Trilling & Fadel, 2012). Meanwhile, the Hewlett Foundation presents a model more focused on deeper learning and involving mastery of core content, critical thinking, problem-solving, collaborative skills, the need for communication aptitudes, self-directedness, and mindset (Hewlett Foundation, 2017; Hilton, 2015). This absence of a shared vision led the National Research Council to conduct a study in hopes of gaining not only a richer understanding of the significance of 21st century skills, but also their correlation to learning (Hilton, 2015; National Research Council, 2013)

The National Research Council finds that 21st century competencies do encourage deeper levels of learning (Hilton, 2015; National Research Council, 2013). Furthermore, attainment of these competencies could affect the dissimilarities in academic attainment and, in turn, better prepare our students for success in later jobs, careers, and life (Hilton, 2015; Horn et al., 2015; National Research Council, 2013). To effectively implement 21st century skills will require a

substantial systemic focus and development of supportive policies, new research-based curriculum, instructional practices, changes in assessment, and new educational methods for pre-service teaching programs, along with professional development for in-service educators (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Faulkner & Latham, 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). Teachers must not only understand 21st century competencies, but also how those competencies transform instructional practice and deepen student learning in the classroom setting (Ellis, 2012; Faulkner & Latham, 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sadaf et al., 2016; Sharkey & O'Connor, 2013).

Explicit teaching of 21st century skills can influence students' lives outside the brick and mortar of the classroom (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015; Jacobson-Lundeberg, 2016; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wright & Jones, 2018). Despite economic status, purposeful instruction of 21st century skills influences student self-efficacy of communication, collaboration, and credibility (Jacobson-Lundeberg, 2016). Communication is a key entry point to effectively mastering 21st century skills such as problem-solving, critical reasoning, or even risk taking (Jacobson-Lundeberg, 2016; Jones, 2015; P21, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). The ability to discern appropriate times to use different types of communication, such as formal or informal communication, can promote confidence among students (Jacobson-Lundeberg, 2016; Jones, 2015). Experiences that combine communication and student collaboration offer students opportunities to compromise as well as to develop strategies to overcome individual challenges, practice empathy, and embrace other's perspectives (Jacobson-Lundeberg, 2016; Jones, 2015). The ability to communicate concisely and distinctly helps in establishing trust and believability (Jacobson-Lundeberg, 2016).

Increased communication skills of learners are self-empowering and applicable in students' daily lives outside of school (Jacobson-Lundeberg, 2016; Jones, 2015).

The NMC/CoSN Horizon Report: K-12 Edition presents the yearly collaborative research of 59 international education and technology experts, generating a comprehensive report on the trends and technologies that will impact education worldwide (Adams Becker et al., 2016; Freeman, Adams Becker, Cummins, Davis, & Hall Giesinger, 2017). This yearly report establishes and identifies six separate educational trends and separates them into three different categories: short-term (trends that are a driving force in educational technology now and will become commonplace in 1-2 years); mid-term (agreed upon trends that will continue to impact and drive educational technology decisions for next 3-5 years); and long-term (already impacting decisions, and will continue to be a factor 5 years or more) (Adams Becker et al., 2016; Freeman et al., 2017). Along with determining educational trends, the report also names specific challenges schools may face when attempting to implement those trends. The panel points educators to significant, current technology that can support the development of innovation and transformation, and it suggests that all information be considered from three separate facets - policy, leadership, and practice (Adams Becker et al., 2016; Freeman et al., 2017).

Trends considered significant and projected to impact education over the long term involve redesigning learning spaces, rethinking the culture of how schools operate, and incorporating deeper-learning instructional approaches (Adams Becker et al., 2016; Freeman et al., 2017). Educational learning environments must become conducive to 21st century instructional practices, with a focus on student-centered instruction (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Freeman et al., 2017; Horn et al., 2015; Sharkey & O'Connor, 2013). Substantial funds are spent each year on buildings rooted in 100-year-old, traditional

philosophies, and to not address the need for 21st century instructional practices is to overlook and ignore the impact that flexible and interactive learning environments can have on classroom practices and student learning (Adams Becker et al., 2016; Gordy et al., 2018; Horn et al., 2015; Sharkey & O'Connor, 2013).

Momentum is building regarding the influence of innovative design on the overall structure of school design (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). Models involving innovative practices such as project-based, competency-based, project-based, challenged-based, or virtual-based instruction are pushing school and instructional design as well as educational policy (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Hilton, 2015; Horn et al., 2015; Voogt et al., 2013). These educational approaches drive educational leaders to reflect on such issues as organic learning spaces, eliminating bell schedules, and the question of what constitutes student seat-time (Adams Becker et al., 2016; Horn et al., 2015; Lemley et al., 2014; Saeki & Quirk, 2015; Sharkey & O'Connor, 2013).

Developments driving education and policy will continue to advance in hopes of increasing collaborative learning and deeper learning approaches (Adams Becker et al., 2016; Freeman et al., 2017; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013). In order to have a collaborative learning environment, educational practices must place learners at the center of the design, providing purposeful interaction, intentional collaboration, and engage students in problem-solving of authentic, real-life issues (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Freeman et al., 2017; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013) These practices complement the recognized need for deeper learning amongst our students. Along with problem-solving and collaboration, deeper learning

reinforces the need for self-directed learning and critical thinking skills (Adams Becker et al.,

2016; Aslan & Reigeluth, 2013; Gordy et al., 2018; Herro & Quigley, 2016; Hilton, 2015; Horn

et al., 2015). Findings suggest these essential skills can be fostered using multiple online tools

and applications (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Henriksen et al., 2016;

Horn et al., 2015; Sharkey & O'Connor, 2013).

      Pressing, short-term movements currently being addressed in schools worldwide involve

coding as a new literacy, students as creators, and STEAM education (Adams Becker et al.,

2016; Freeman et al., 2017). Research indicates that jobs involving computing competencies are

increasing rapidly and offering high paying positions to those possessing the needed skills. It is

estimated that 500,000 current positions remain vacant in the workplace due to a lack of

qualified applicants capable of filling them (Adams Becker et al., 2016; Freeman et al., 2017)

With the dynamics of today's economy, students must be fluent in this new literacy to be

competitive (Adams Becker et al., 2016; Freeman et al., 2017). Makerspaces, as well as

increased online learning, are practices expected to take place in schools (Adams Becker et al.,

2016; Freeman et al., 2017). This is projected to be followed by the subsequent adoption of

robotics, the explicit use of virtual reality, artificial intelligence, and wearable technology

(Adams Becker et al., 2016; Freeman et al., 2017).

      Students have long consumed content in our current educational structure (Adams Becker

et al., 2016; Couros, 2015; Gillard et al., 2015; Horn et al., 2015). With the technologies of

today, a more active push has emerged calling on students to create (Adams Becker et al., 2016;

Bishop & Counihan, 2018; Couros, 2015; Henriksen et al., 2016; Horn et al., 2015; P21, 2016;

Trilling & Fadel, 2012). Using technologies to practice and enhance student creativity can lead to

deeper levels of application, meaningful engagement, and students as content publishers (Adams

Becker et al., 2016; Aslan & Reigeluth, 2013; Couros, 2015; Henriksen et al., 2016; Horn et al.,

2015; Trilling & Fadel, 2012). Profound challenges facing transformation in education come in a

lack of authentic learning experiences being provided to students, identifying and rethinking the

roles of teachers, and advancing digital equality for all students (Adams Becker et al., 2016;

Hilton, 2015; Horn et al., 2015; Trilling & Fadel, 2012). Even greater are the challenges

surrounding the existing achievement gap and sustainable infrastructures and systems that

provide data and quality pedagogy to support personalized learning (Adams Becker et al., 2016;

Hilton, 2015; Horn et al., 2015). Figure 5 and Figure 6 summarize the 2016 and 2017 Horizon

Reports as it relates to technology adoption in K-12 education (Adams Becker et al., 2016;

Freeman et al., 2017).

There are multiple models of blended learning permeating schools across the country

(Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Bebell, 2005; Henriksen et al., 2016;

Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). Using Clayton

Christianson's definition of Disruptive Innovation, blended learning models are analyzed on

whether various forms of blended learning disrupt or sustain existing educational practices

(Christensen, Johnson, & Horn, 2008; Horn et al., 2015). The indication suggests that because of

varied model implementations, the answer may be both. While some models of blended learning

provide encouraging progress in the traditional classroom setting, they do little to disrupt the

status-quo (Christensen et al., 2008; Horn et al., 2015). However, other models of blended

learning cause great disruptive innovation but fail to impact the system outside of the classroom

environment (Christensen et al., 2008; Horn et al., 2015).

Figure 5

Infographic of the 2016 k-12 NMC/CoSN Horizon Report

Topics from the *NMC/CoSN Horizon Report: 2016 K-12 Edition*

TRENDS, CHALLENGES, AND TECHNOLOGIES FOR SCHOOLS

TRENDS

SHORT-TERM
> Coding as a Literacy
> Students as Creators

MID-TERM
> Collaborative Learning
> Deeper Learning Approaches

LONG-TERM
> Redesigning Learning Spaces
> Rethinking How Schools Work

2016   2017   2018   2019   2020

CHALLENGES

SOLVABLE
> Authentic Learning Experiences
> Rethinking the Roles of Teachers

DIFFICULT
> Advancing Digital Equity
> Scaling Teaching Innovations

WICKED
> Achievement Gap
> Personalizing Learning

NEAR-TERM
1 year or less
> Makerspaces
> Online Learning

MID-TERM
2-3 years
> Robotics
> Virtual Reality

FAR-TERM
4-5 years
> Artificial Intelligence
> Wearable Technology

DEVELOPMENTS IN TECHNOLOGY

Note: From NMC/CoSN horizon report, by NMC/CoSN horizon report: 2016 K-12 edition, by Adams Becker et al., 2016, *(https://www.nmc.org/publication/nmc-cosn-horizon-report-2016-k-12-edition/).* Copyright 2016 by The New Media Consortium. CC BY-NC-ND.

Figure 6

Infographic of the 2017 k-12 NMC/CoSN Horizon Report
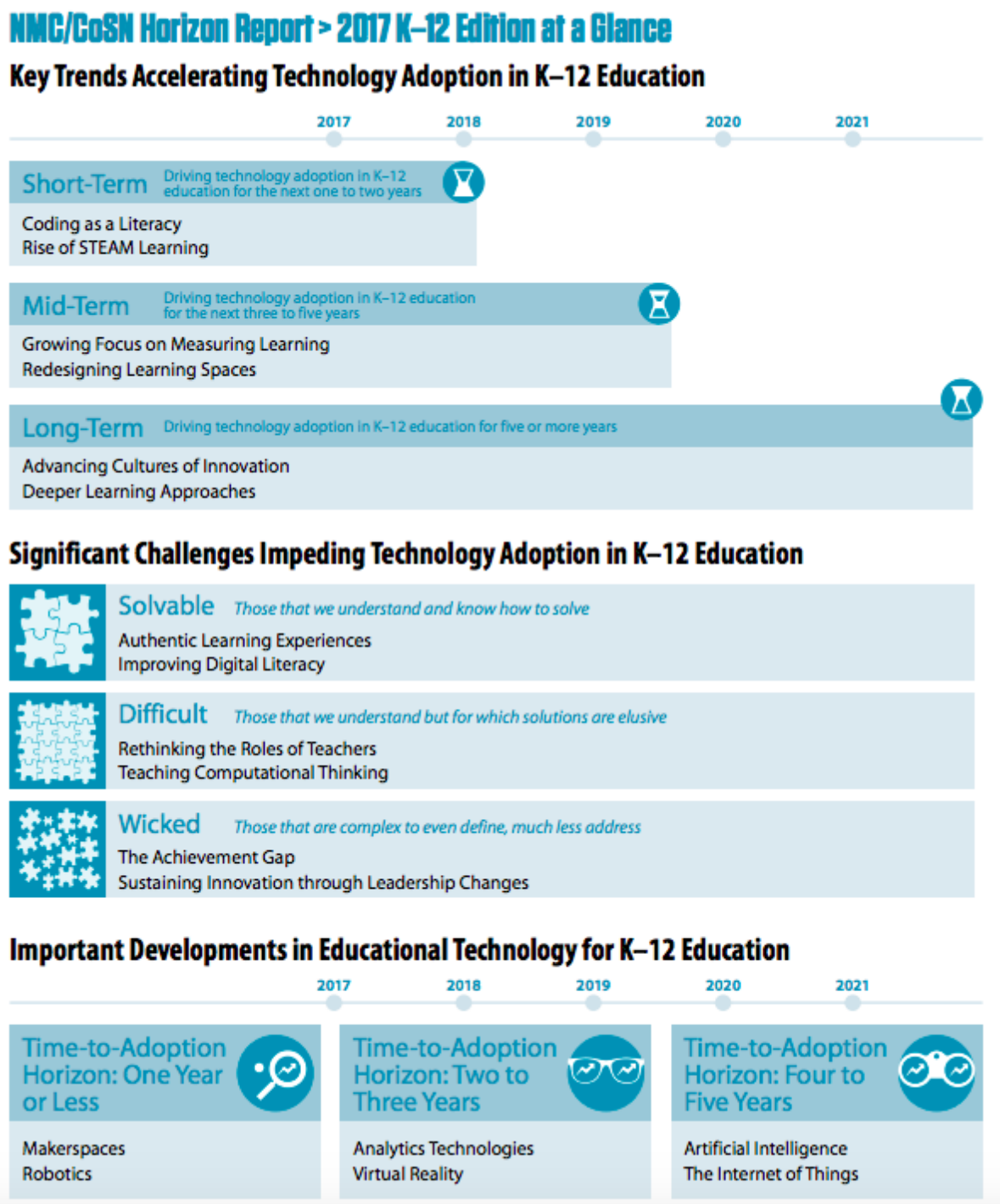
Note: From NMC/CoSN horizon report, by NMC/CoSN horizon report: 2017 K-12 edition, by Freeman et al., 2017, *(https://cdn.nmc.org/media/2017-nmc-cosn-horizon-report-k12-EN.pdf).* Copyright 2017 by The New Media Consortium. CC BY-NC-ND.

Blended models with the most potential of reshaping the instructional paradigm of personalizing and building competencies for students involve such approaches as Individual Rotation, Flex, A Le Carte, or Enriched Virtual models (iNACOL, 2015a; Horn et al., 2015). A significant change throughout the various models involves the role of the teacher. No longer the content conduit located in the front of the room, educators take on the distinctive function of instructional designer, placing them in the role of facilitator, project leader, and mentor (Adams Becker et al., 2016; Gillard et al., 2015; Horn et al., 2015). Although models such as Station Rotation, Lab Rotation, and Flipped Classrooms allow for less disruptive innovation in the classroom setting, these hybrid models of blended learning reinforce lessons, continue conversations, and add advancing structures to propel needed change and educational evolution (Horn et al., 2015; iNACOL, 2015a).

To fully embrace the advancements of innovation in education, providing for a student's personal learning and competencies, we must consider funding, policy, and learning space (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015). Decreased funding continues to plague the educational system, producing cuts not only in school days, but also in the professional time of teachers. To regain some of that time, schools have looked to afterschool or extended hour programs to help address the needs of their students (Horn et al., 2015; Jacobson-Lundeberg, 2016). The physical learning space plays a vital role in instructional practice. This includes the way the environment is designed. It also extends to the structure of the day such as bell schedules, cross-disciplinary learning, and digital infrastructure (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015; Lemley et al., 2014; Sharkey & O'Connor, 2013). If school systems only provide technology-rich environments, without addressing the teaching and learning practices, they are continuing to support and sustain the instructional practices of the

industrialized educational system (Couros, 2015; Horn et al., 2015; Lemley et al., 2014; Sharkey & O'Connor, 2013).

Schools should be intentional about instituting instructional practices that encourage student learning and application of knowledge at deeper levels (Couros, 2015; Horn et al., 2015; Kim, 2015; Koh et al., 2012; Lemley et al., 2014; Sharkey & O'Connor, 2013; Vander Ark, 2018; Wright & Jones, 2018). Such preparation ensures that students will be encouraged to explore, express themselves creatively, collaborate, and communicate using varied functions while evidencing critical thinking skills and mastery of content (Adams Becker et al., 2016; Horn et al., 2015; Koh et al., 2012; Ruddell, 2017; Sharkey & O'Connor, 2013; Vander Ark, 2018). Technology alone does not create a 21st century learning environment. A 21st century learning environment occurs when technology is used to create relevant, deep level learning experiences (Couros, 2015; Horn et al., 2015; Kim, Kim, Lee, Spector, & DeMeester, 2013; Pahomov, 2014; Schuitema et al., 2012; Trilling & Fadel, 2012). These experiences put students in the driver's seat of learning, empowering them to lead in the education process (Couros, 2015; Pahomov, 2014; Trilling & Fadel, 2012). If used in classrooms effectively, technology can be transformational with the ability to personalize a student's instructional experience and offering multiple modalities for students to evidence learning (Couros, 2015, Pahomov, 2014; Ruddell, 2017; Trilling & Fadel, 2012).

Technology has an overwhelming presence in today's society. Today's learner is not only accustomed to, but demands knowledge and information at a rate of speed never previously possible (Horn et al., 2015; Lemley et al., 2014; Pahomov, 2014; Trilling & Fadel, 2012). No longer the giver of knowledge and content, teachers must now be designers of learning, creating environments where students can be engaged, and ultimately successful (Adams Becker et al.,

2016; Couros, 2015; Gillard et al., 2015; Hilton, 2015; Kim, 2015; Lemley et al., 2014; Saeki & Quirk, 2015). For technology to be transformative, educators must become familiar with the learning devices and build knowledge on what the device can offer in the student experience (Couros, 2015; Kim et al., 2013; Pahomov, 2014; Trilling & Fadel, 2012). Creating vision among educators by providing the "why" behind technology use in the classroom is vital (Couros, 2015; Kim et al., 2013; Pahomov, 2014).

Research is calling for changes to the industrialized educational model to better serve the needs of our current 21st century learners (Aslan & Reigeluth, 2013; Couros, 2015; Henriksen et al., 2016; Horn et al., 2015; Johnson, 2009; Sharkey & O'Connor, 2013; Voogt et al., 2013). Although many studies have explored instructional practices, content, and overall environment, little is discussed regarding the type of mindset, attributes, and dispositions educators will need in the 21st century educational landscape (Couros, 2015; Faulkner & Latham, 2016). Dispositions identified as critical for 21st century educators are also recognized as needed success skills for today's 21st century learners. These collective characteristics include empathy, a willingness to take risks, creative problem-solving/finding skills, resilience, networking abilities, observational skills, and the ability to be reflective (Couros, 2015; Faulkner & Latham, 2016; iNACOL, 2014). In facing the 21st century classroom, educators will need to model and foster practices that further develop these aptitudes in students, engaging learners in innovative, real-world problems with collaborative discourse that develops independent ideas (Couros, 2015; Ellis, 2012; Faulkner & Latham, 2016; iNACOL, 2014; Hilton, 2015; Kim, 2015; Sharkey & O'Connor, 2013).

Technology in the Classroom

Today's students show a sincere desire to collaborate, communicate, and feel consistently connected to information and the world around them (Couros, 2015; Kingston, 2014; Sharkey & O'Connor, 2013). The day to day use of technology amongst students does not in itself assure proficiency of higher digital or informational literacy skills (Friedman & Heafner, 2007; Horn et al., 2015; Sharkey & O'Connor, 2013). Though educators recognize that information literacy skills are of growing importance in every profession and academic discipline, the struggle to reach an agreement regarding which informational literacy skills and attributes most benefit students remains (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). To successfully integrate technology into an educational program, educators must propose digital interactions to support identified academic outcomes, pedagogy, and authentic assessment, creating effective instructional environments that support and engage the intellectual process (Adams Becker et al., 2016; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012).

The term Informational Literacy, itself, is the acknowledgment that information and technology are no longer stand-alone entities, instead supporting the concept that information and technology are indissolubly linked (Couros, 2015; P21, 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). Applicable integration of technology occurs when educators see technology as a support to instructional design. The technology approaches used by an educator should enhance student outcomes, advance student's understanding, and provide purpose to the overall learning activity (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Couros, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013). Although some pedagogical practices should never be abandoned just to incorporate technology, technology can provide learning environments that support diverse learners, relevant deeper-level learning experiences,

and environments of collaboration and support where students can seek assistance and explore individually (Adams Becker et al., 2016; Horn et al., 2015; Lemley et al., 2014; Ruddell, 2017; Sharkey & O'Connor, 2013). Students need to establish technology as a tool that enables them to not only learn but also process the new information encountered (Couros, 2015; Horn et al., 2015; Lemley et al., 2014; Sharkey & O'Connor, 2013; Vander Ark, 2018).

Incorporating informational literacy skills and not incorporating new assessments can adversely affect the desired learning environment (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al, 2013). Assessments ought to inspire students while providing deeper-level, authentic, and formative opportunities that are transparent to the learning process (Henriksen et al., 2016; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013). Technology can be a driving force in this shift, supplying educators with the influential data required to address student needs and effectively deliver student content (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Horn et al., 2015; Koh et al., 2012; Vander Ark, 2018). Technology can provide students with the means to self-select learning goals and tools to accomplish those targeted outcomes, highlighting the difference between technology integration and technology transformation (Aslan & Reigeluth, 2013; Horn et al., 2015; Lemley et al., 2014; Vander Ark, 2018).

Creativity is acknowledged and highlighted as a key attribute for success in our current and future society (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). With living in such a technology-rich culture, creativity in education must be explored within the context of educational technology (Adams Becker et al.,

2016; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). The reach and advancements of educational technologies have changed and continue to revolutionize the possibilities for innovations and inventiveness of instructional practice (Adams Becker et al., 2016; Couros, 2015; Henriksen et al., 2016; Horn et al., 2015; Ellis, 2012, Sharkey & O'Connor, 2013). Even in isolation, the topics of creativity and technology in education carry substantial intricacies when related to instructional pedagogy and educational assessment (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Hilton, 2015, Horn et al., 2015; Koh et al., 2012).

Many intricacies of technology transformation exist, and research centered around student engagement through inquiry learning and the development of student websites demonstrates another complexity (Friedman & Heafner, 2007). One such study involved two 11th-grade history classes, with one class acting as a control group and the other a test group. While the control group's unit on WWII was instructed with the same instructional practices as in previous courses, the other session's unit was facilitated in the computer lab with a focus on inquiry-based learning. In the end, both groups of students were given a common unit-end exam (Friedman & Heafner, 2007). Although most participants received high scores of A's and B's on the task, the scores did not render or have a significant impact on quality scores on the end of unit assessment.

Many students indicated a desire to repeat a similar project, while a few reported disagreements (Friedman & Heafner, 2007). Interestingly, similar reasoning attributed to the opposite opinions of the students, with one identified factor being that the expanded amount of work included in the project was greater than the students were used to (Friedman & Heafner, 2007). Even though quantitative data did not show a significant increase in student learning on

the end of unit assessment, the data does not demonstrate a loss (Friedman & Heafner, 2007).

Moreover, this task allowed students to creatively work with content while students expressed

satisfaction, engagement, and motivation in class. While technology showed little advantage in

this singular unit study, one limitation of the research included questioning if the use of an

unfamiliar and dramatic shift of instructional practice could have contributed to the results

(Friedman & Heafner, 2007). Students' lack of capacity in using technology redefined the

instructional setting, creating a foreign learning environment for students (Friedman & Heafner,

2007).

Education technology leaders also display common comprehensive philosophies

regarding technology. First, educational technology leaders view technology as a tool that should

support instructional focus (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Henriksen et

al., 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Webster, 2017).

Furthermore, educational leaders in the field see technology as a resource to reach resolute

instructional goals and objectives. This generally-held philosophy clearly correlates with the

heavily maintained perspective that it is a crafted curriculum, rather than technology, which

should drive educational decisions and outcomes (Couros, 2015; Horn et al., 2015; Webster,

2017). Leaders in this field also share a common perspective or philosophy surrounding the

unavoidability of technology change. This viewpoint, however, stems from a place of optimism

and hope for not only education, but also the global society (Adams Becker et al., 2016; Couros,

2015; Horn et al., 2015; Webster, 2017). This philosophy echoes another shared theme: keep up

or face the real likelihood of getting left behind (Webster, 2017). While this philosophy can lead

to quick action, it can at times conflict with ensuring that the use of technology aligns with

instructional and curricular learning outcomes of our students (Ruddell, 2017; Webster, 2017; Voogt et al, 2013).

The power of creativity and educational technology should inspire change in the current educational system (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). Role modeling is a key attribute of change, expressing that it is the human tendency to mimic and behave like those around us (Basford & Schaninger, 2016; Göksün & Kurt, 2017). To develop creative tendencies and 21st century aptitudes in students, learners must have teachers who can actively model such skills through innovative pedagogical practices in the classroom environment (Couros, 2015; Faulkner & Latham, 2016; Henriksen et al., 2016; Göksün & Kurt, 2017). Pre-service education programs must emphasize and develop instructional approaches and practices that support a creative mindset and enhance pedagogy in a technology-rich environment (Henriksen et al., 2016; iNACOL, 2014; Göksün & Kurt, 2017). Furthermore, pre-service teaching programs should have specific courses focused on the objective and exposure of creativity and educational technology in instruction using an identified framework or model, creating elements and accountability of these characteristics throughout the education program and coursework (Henriksen et al., 2016; iNACOL, 2014; Kafyulilo, Fisser, & Voogt, 2015; Göksün & Kurt, 2017; Sadaf et al., 2016).

Conclusion

Literature reviewed for this study revealed the need for schools to focus on creating learning environments conducive to student success in current and future society by fostering identified and highlighted 21st century skills (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Carver, 2016; Couros, 2015; Ellis, 2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009;

Trilling & Fadel, 2012; Voogt et al., 2013). Research also pinpointed the disconnect that exists among educational stakeholders regarding how to best accomplish this task (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). P21 Framework for 21st Century Learning has attempted to overcome this stakeholder divide by forming an alliance built around a common vision for student capacity in 21st century skills (P21, 2016; Trilling & Fadel, 2012).

One consensus found in reviewed research centered around the needed changes in student assessment with more 21st century reforms demanding students to master higher-order, critical thinking, and problem solving skills (Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). Students need to be active participants in authentic assessment which is multi-faceted, sensitive to a student's unique areas of development, and places students in a position to create a product that displays evidence of learning (Ellis, 2012; Henriksen et al., 2016; Koh et al., 2012; Ruddell, 2017; Trilling & Fadel, 2012). Learning environments that support autonomous structures, such as student choice or student inquiry through collaborative or individualized learning models, have been shown to increase student motivation and academic achievement and to extend deeper learning (Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Crow, 2009; Deci & Ryan, 2008; Evans & Boucher, 2015; Gillard et al., 2015; Koh, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). Future jobs in today's society are requiring skills of information acquisition, the analyzation of data, application of new knowledge, and creative problem-solving abilities (Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; iNACOL, 2015a; Koh et al., 2012; Nisha & Rajasekaran, 2018; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). An instructional environment that fosters these

skills requires an education system that mentors, coaches, and guides in the learning process, offering student choice, promoting student agency, and encouraging performance-based assessments to demonstrate evidence of mastery (Couros, 2015; Ellis, 2012; Horn et al., 2015; iNACOL, 2015a; Ruddell, 2017; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013).

Chapter III

Design and Methodology

Introduction

The purpose of this mixed methods study was to examine upper elementary student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms. Existing research supports a positive dynamic between student choice and a student's level of learning, engagement, motivation, and self-efficacy (Buchanan et al., 2016; Crow, 2009; Kim, 2015; Thompson & Beymer, 2015; Wang & Eccles, 2013). With ever-changing societal shifts, the educational landscape must evolve to engage the demands, as well as the needs, of current and future students (Aslan et al., 2013; Ellis, 2012; Faulkner & Latham, 2016; Lemley et al., 2014; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013). Qualities such as self-directedness, student agency and ownership, judgment and decision making capabilities, management of goals and time, and displaying initiative and self-direction have all been identified as essential 21st century skills that dictate a shift to student-centered approaches of instruction in the classroom setting (Hilton, 2015; Horn et al., 2015; P21, 2016). Additionally, digital and informational literacy skills are acknowledged as essential proficiencies to ensure success in our modern global world. This reality further challenges the existing educational school structure (Adams Becker et al., 2016; Bishop & Counihan, 2018; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). The depth of this 21st century student skillset necessitates that schools develop accurate methods of assessing student learning (Ellis, 2012; Henriksen et al., 2016; Horn et al., 2015; Koh et al., 2012; Voogt et al., 2013).

Student choice and student autonomy are reflected attributes of a student-centered 21st century learning environment (Hilton, 2015; Horn et al., 2015; Trilling & Fadel, 2012). Furthermore, the presence of choice in student-centered assessments in which students have autonomy in evidencing their learning can positively impact student performance, engagement, self-efficacy, and motivation (Aslan & Reigeluth, 2013; Clark, 2012; Ellis, 2012; Gillard et al., 2015; Núñez & León, 2015; Thompson & Beymer, 2015). Research indicates the ongoing need to examine student perspectives of how student-centered learning approaches impact students' attitudes and aptitudes identified as necessary for a technology-rich and globally connected society (Buchanan et al., 2016).

Chapter III discusses the research design and methodology employed in order to collect and assess data related to student perceptions of choice and autonomy during student-centered assessments using self-selected technology-based platforms. This chapter provides an overview of the researcher's role and specific elements pertaining to the study's procedures such as research population, site, instrumentation, and analysis relating to the explanatory sequential study. Furthermore, discussion surrounding reliability and limitations are addressed.

Research Questions

1. How does self-selected technology choice impact students' perceptions of student-centered assessments?

2. What are students' perceptions of choice in evidencing their learning using technology-based platforms?

3. When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?

4. Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?

Research Design

This study used an explanatory sequential mixed methods design to explore student perceptions of choice and autonomy when evidencing learning during student-centered assessments using self-selected technology-based platforms. A mixed methods study collects and analyzes both quantitative and qualitative information, thereby "mixing" the data sources and providing the researcher with a richer, more comprehensive explanation to the stated research problem (Creswell, 2009, 2015; Ivankova et al., 2006, Johnson & Onwuegbuzie, 2004). Although many mixed methods research designs exist in literature today, one popular design in social and behavioral sciences research is explanatory sequential mixed methods (Creswell, 2009, 2015; Ivankova et al., 2006). For researchers employing a mixed methods approach, struggles exist in both determining the most effective order of data collection and where to place significance in analyzing the qualitative and quantitative data gathered (Creswell, 2009, 2015; Ivankova et al., 2006). Following the use of explanatory sequential mixed methods design, data collection for this research study took place over two separate phases. One unique characteristic of the explanatory sequential mixed methods approach is in its collection and use of the data (Creswell, 2009, 2015; Ivankova et al., 2006). Accumulating its data "in sequence," quantitative data and qualitative data is collected and analyzed separately. As seen in Figure 6, while quantitative methods are used in the initial phase of the research, qualitative measures are applied to illuminate, affirm, or further understand the quantitative results (Creswell, 2009, 2015; Ivankova et al., 2006).

Figure 7

Conceptual Process of Explanatory Sequential Mixed-Methods Design
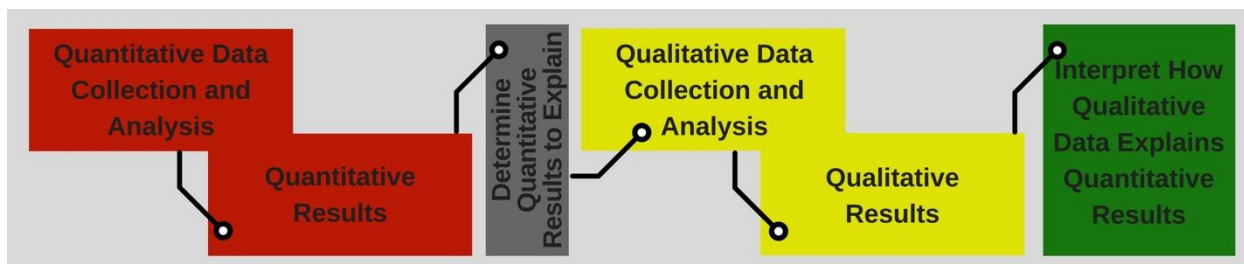
Note: Adapted from Creswell, J. W. (2015). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. Boston, Pearson. p. 554

Methods of data collection in research are numerous and include anything from surveys, interviews, focus groups, observations, data extraction, or even secondary data sources (Creswell, 2009, 2015; Harrell & Bradley, 2009; Marshall & Rossman, 2015). As per explanatory sequential design, quantitative research will act as a catalyst for the study's first stage of inquiry (Creswell, 2009, 2015; Ivankova et al., 2006). Through the use of a Likert-based survey instrument, quantitative data was first examined to explore student perceptions as it relates to choice in student-centered assessments, self-selection of technology-based platforms, teacher-driven vs. student-centered assessments, and students' academic efficacy.

Driven by collected quantitative outcomes, phase two of this study incorporated the use of qualitative semi-structured focus groups to deepen and strengthen the understanding of student's perceptions as they pertain to the identified and established research questions. With an interview protocol influenced by quantitative data, semi-structured focus groups concentrated on seeking clarification of data assessed in the quantitative survey (Creswell, 2009, 2015; Ivankova et al., 2006). As one of the many data collection options available to researchers, qualitative semi-structured focus groups can offer depth of information to a study's questions that numerical data may not (Creswell, 2015; Harrell & Bradley, 2009; Marshall & Rossman, 2015).

Conducting semi-structured focus groups can benefit a study by offering explanations to inconsistent data and the ability to conclude what emphasis a particular topic or issue of a study should hold (Creswell, 2015; Harrell & Bradley, 2009; Marshall & Rossman, 2015). In the correct research design, focus groups can also allow for generalizations, timeliness, thoughtfulness to specific issues, and classification of information collected (Creswell, 2009, 2015; Harrell & Bradley, 2009; Marshall & Rossman, 2015).

Semi-structured protocols are an established technique used in either a qualitative or mixed methods design approach (Creswell, 2015; Marshall & Rossman, 2015). Semi-structured protocols are effective for collecting perceptions, opinions, and attitudes of study participants, and in aiding a researcher in gaining knowledge regarding specific background information, facts, or processes (Harrell & Bradley, 2009). Depending on the types of questions chosen by the researcher, a semi-structured protocol may be able to ascertain varied facets of each type of data (Harrell & Bradley, 2009; Marshall & Rossman, 2015). Researchers can gather multiple kinds of information during semi-structured focus groups by employing various types of questioning techniques, including descriptive questions, structural questions, and contrast questions (Harrell & Bradley, 2009; Marshall & Rossman, 2015).

Participants

Quantitative. Purposeful sampling methods were used to identify the 297 student participants involved in the initial quantitative portion of this study. Purposeful sampling is used when researchers are deliberate in the selection of research sites and/or participants in order to maximize what is absorbed or examined regarding a potential phenomenon (Creswell, 2015). According to Creswell (2015), if purposeful sampling is used, a researcher must be able to defend the decisions made on the specific sites included in the research study. The 297

participants were a part of a larger sample population of 433 upper elementary students exposed to autonomous attributes, instructional practices, and a 21st century learning environment as established by the following criterion:

- Students were a part of a 1:1 classroom learning environment.

- Students were enrolled in schools and/or classrooms where teachers had participated in a minimum of 20 hours of professional development focused on building technology capacity of teachers and students through the use of multiple technology-based platforms to complete assessments or evidence learning.

- Students were enrolled in schools and/or classrooms where educators were trained to include instructional strategies on developing student's personal choice and autonomy in completing assessments or evidencing learning.

- Students were enrolled in schools and/or classrooms where they were given one or more opportunities a week, either individually or collaboratively, to self-select a technology-based platform to complete assessments or evidence learning outcomes.

Influenced by P21's Framework for 21st Century Learning, the environment for this research was instrumental, promoting the student-centered pedagogy needed to support student choice, autonomy, authentic assessment, and multiple literacies (P21, 2016; Trilling & Fadel, 2012).

Two school districts with such learning environments were identified (see Appendix G and Appendix H). The first school district was a semi-rural district in the Pacific Northwest that serves approximately 14,000 students. In 2016, this district launched a personalized learning initiative equipping teachers and students with a 1:1 learning environment focused on four key components: integrated digital content, targeted instruction, data driven decisions, and student reflection and ownership. Participant classroom sites were comprised of 6 fourth-grade

classrooms and 7 fifth-grade classrooms across two different school sites where teachers expressed willingness to incorporate choice and autonomous structures into instructional practices, including student-centered assessments. The second Pacific Northwest school district is considered a rural school district, educating approximately 500 students. Similarly, in 2016, this district launched a 1:1 personalized mastery-based environment aimed at embracing innovation, student ownership of learning, growth mindset, increasing academic achievement, and creating students who positively impact the world. This district provided three classrooms with participating students in fourth grade, fifth grade, and sixth grade.

Schools and classrooms involved in the study had various student demographics and populations. As introduced in Table 1, variances among district sites involved in the study include school size, student ethnicity, and social economic status as measured through the school's reported free and reduced lunch percentages.

Table 1

Participating School Demographics

	District #1: Site #1	District #1: Site #2	District #2 Site #1
Student Enrollment	592	473	297
Student Ethnicity:			
White	477	348	95
Hispanic	99	81	193
Black/African American	5	5	3
Asian	3	4	2
Native American & Native Hawaiian	2	12	3
Other (Multiple Races & Unclassified)	6	23	1
Free and Reduced Lunch	35.18%	46.32%	100%

Note: Names of districts and schools have been omitted to protect anonymity of participants

The 297 study participants consisted of 68.59% of the potential student sample identified for the study. Participants included 150 (50.5%) females and 147 (49.5%) males with 133 fourth-

grade students, 141 fifth-grade students, and 23 sixth-grade students. Students with severe and profound needs, not participating in general education core instruction, were excluded from the study. Because the study sought to explore student perspectives surrounding student choice and autonomy, assessment, and use of self-selected technology tools, it is important that the data be reflective of students who are receiving a similar type of instruction and can speak to, and express the processes used in their thinking. However, exclusions of participants did not extend to special education qualified students who participate in general education classroom instruction.

Qualitative. The qualitative sample of 39 students stemmed from the initially selected 297 students who participated in the prior quantitative portion of the study. Participation in the semi-structured peer focus groups was voluntary but decisive. Multiple sampling methods were incorporated into the structuring of peer focus groups. Criterion sampling was used as a first filter, confirming all students had participated in the quantitative phase one of the study (Marshall & Rossman, 2015). Once each of the eligible participants for the site-based focus groups was identified, purposeful sampling was used to ensure representation of participants and to confirm the focus group's demographics were characteristic of the overall sample (Creswell, 2015; Palinkas et al., 2015). The researcher enlisted the teachers of participating students to form focus groups of student volunteers that were inclusive of all study classrooms and demonstrated efforts to mimic demographics and diversity of the overall study sample including grade level, gender, ethnicity, and disposition of learner.

The correct size of a focus group is highly related to the purpose of one's research (Morgan, 1998). While research does offer suggestions regarding the number of participants to include in focus groups, that exact number varies with some proposing six to ten members, while

others advocate for anywhere from eight to twelve (Marshall & Rossman, 2015; Merton, Fiske, & Kendall, 1990; Morgan, 1998). Both ends of the spectrum hold inherent hazards for the research. If there are too few participants, the data collection may be minimized and impede the study. Likewise, too many participants can prove to be a challenge for a researcher to manage (Fern, 1982; Morgan, 1998). The study incorporated five face-to-face, semi-structured peer focus groups, each with 7 or 8 participants. Each focus group was approximately 45-minutes in length, with two focus groups at study sites with higher classroom participation, and one focus group conducted at the remaining study site with 3 participating classrooms. Each identified focus group participant participated in a peer focus group session held at the student's enrolled school three to four weeks after taking the initial quantitative survey. As shown in Table 2, qualitative focus group participants were comprised of 19 females and 20 males, with 18 fourth-grade students, 18 fifth-grade students, and 3 sixth-grade students.

As per explanatory sequential design, phase one of the study involved quantitative survey data (Creswell, 2009, 2015; Ivankova et al., 2006). Weight and priority is placed on quantitative data in this research approach, looking to analyze quantitative data to drive qualitative questioning (Creswell, 2009, 2015; Ivankova et al., 2006). Quantitative survey completion and data analysis of phase one was completed 3 weeks prior to qualitative semi-structured peer focus groups, allowing the researcher time to confirm or adapt the projected semi-structured peer focus group protocol (see Appendix I).

Table 2

Demographics of Focus Group Student Participants

	District #1: Site #1 F.G. #1	District #1: Site #1 F.G. #2	District #1: Site #2 F.G. #1	District #1 Site #2 F.G. #2	District #2 Site #1 F.G. #1
Size of Group	8	7	8	8	8
Gender					
Male	6	4	3	3	3
Female	2	3	5	5	5
Student Ethnicity					
White	7	3	5	4	2
Hispanic	0	3	1	3	4
Black/African American	0	1	0	1	0
Asian	0	0	0	0	0
Native American & Native Hawaiian	0	0	0	0	0
Other (Multiple Races & Unclassified)	1	0	2	0	2
Free and Reduced Lunch	*58%	*58%	*58%	*58%	100%

Note: Names of districts and schools have been changed to protect anonymity of participants. F.G. = Focus Group/ The *%, notes the overall free and reduced lunch rate for the 31 participating students in 'District #1'.

Data Collection

In all areas of human study, but especially those involving protected populations, not causing harm should be on the forefront of every researcher's mind (Marshall & Rossman, 2015). In designing this research study, care was taken to promote the respect and safety of all parties involved. Training and certification with the National Institute of Health were completed by the researcher (see Appendix E). Application approval and consents needed to proceed with the study were attained from Northwest Nazarene University's Institutional Review Board (IRB) (see Appendix D). As instructed by law, the researcher will retain all data pertaining to this study for the mandated time. Data has been properly secured in a locked file cabinet or password

protected computer files with access to the materials restricted to the researcher. At the close of the mandatory five-year period, the researcher will dispose of all data materials.

District consent. Known districts with learning environments conducive to the study criterion were contacted by phone and email to seek site approvals. The assistant superintendent and superintendent provided names of principals whose schools identified with the study's established criterion. Depending on the school district protocol, identified principals were contacted and agreements to participate in the study were founded. District permissions were thereby granted (see Appendix G and Appendix H). Once approved, notification of IRB full approval (see Appendix D) was forward to district representatives via email.

Upon IRB and committee approval, emails including the district approval (see Appendix G and Appendix H), parental consent (see Appendix A) and information letter (see Appendix B), were distributed to each principal of the participating schools. Copies of these study materials were also emailed to teachers of participating students. Only students who returned a signed parental consent participated in the research study.

This study relied heavily on specific instructional practices involving student choice in evidencing learning during student-centered assessments using technology-based platforms. Due to this specificity, only students who received instruction in classrooms with a 1:1 learning environment led by teachers who use autonomous instructional supports in their teaching would be eligible for this study. Per study criterion, these teachers received professional development aimed at building both capacity of teachers and students in autonomous practices in the classroom using technology-based tools. In contacting the qualified school's principals, the researcher connected with fourth-, fifth-, and sixth-grade teachers in those school sites through email, telephone, and personal meetings to discuss the opportunity to be involved in the study.

Participation in the study was completely voluntary. Once study classrooms were solidified, an information letter and consent form was provided to parents/guardians. Paper consent forms were distributed by researcher, research assistant (see Appendix K), and/or participant's teacher. A parent/legal guardian of each student was asked to voluntarily have his/her minor son or daughter participate by signing and returning the informed consent form for the study. Contact with participating students was made through a variety of sources and events including, "Back to School Night" open house, email, letters or folders home, and notifications in the class/grade level newsletters.

Quantitative survey. The use of surveys has a long history in the social and educational fields as an established data collection tool (Creswell, 2015). Surveys in research highlight prevailing trends, interest, opinions, beliefs, and attitudes of a population (Creswell, 2015). The developed survey, Technology Choice & Academic Efficacy Student Perception Survey (see Appendix J), was used to assess student perceptions of the following: self-selected technology choice during assessments, choice and evidencing learning using technology-based platforms, teacher-driven vs. student-driven assessments, and whether personal academic efficacy is effected by the ability to self-select and use technology-based platforms during assessment. This survey is reflective of all presented research questions of this study.

The first items of the Technology Choice & Academic Efficacy survey included three demographic-based questions used to delineate a student's gender, ethnicity, and years in classroom with an assigned device. Participant classroom and grade level was established through an independent link and/or QR code used at the time of survey. These factors were important to phase two of the study, identifying and ensuring representation of all participating classrooms. The second part of the Technology Choice & Academic Efficacy Student Perception

Scale included 34 questions, each aimed at accounting for a student's perception as it relates to the study's identified research questions. These items were comprised of 5-point Likert scaled items with classifications including 5-Very Much Agree, 4-Agree, 3-Neither Agree or Disagree, 2-Slightly Disagree, and 1-Very Much Disagree. Survey items were sub grouped, with each subsection targeted to assess one specific research question. When administered, the survey items were presented to students in a combined/mixed pattern.

The last two questions included on the student survey assess the participant's willingness to be involved in site-based focus groups. If the student expresses interest, the survey will collect the student's full name. If the student chooses not to be involved, the survey will end. These questions are used to generate the lists of students for the second, qualitative phase of the study.

With the innovative nature of the school and the access of 1:1 devices for all upper elementary student participants, the Technology Choice & Academic Efficacy Student Perception Survey was distributed to students electronically. Although housed in a web-based platform, Qualtrics™, two electronic options were made available for students to access the survey, a shortened URL which could be typed into an internet browser or a QR code that students could scan using a device. A separate URL and QR code was made for each individual classroom involved to ensure representation from all classrooms during the qualitative portion of the study. All surveys were conducted at the participating school site in order to maintain a more controlled and cohesive study environment. The researcher made it a priority to be present in the participating classrooms when questionnaires were completed and, alongside the classroom teacher, helped students gain access. Quantitative surveys were completed by students in their familiar classroom environment on their accustomed student devices.

Qualitative semi-structured focus groups. During phase one, collection and analysis of survey data, an initial semi-structured interview protocol was piloted and finalized (Creswell, 2009, 2015; Ivankova et al., 2006). Both the researcher's review of the literature and data generated by the quantitative survey served as a vehicle in crafting the contextualized, non-leading and open-ended questions included in the protocol's preliminary draft (Creswell, 2009, 2015; Ivankova et al., 2006). The creation of an interview protocol adds another layer of continuity to a researcher's study, providing detail to the interview process, pre-generated questions and probes, and a predetermined place for annotated documentation of researcher (Creswell, 2015; Marshall & Rossman, 2015).

The use of qualitative semi-structured peer focus groups in phase two of this sequential explanatory design helped to further examine and understand analyzed quantitative data (Marshall & Rossman, 2015). Focus groups serve as a viable option for researchers when desiring to capture shared experiences of multiple participants as well as to compile opinions of the individuals (Creswell, 2015; Marshall & Rossman, 2015). The use of focus groups has its advantages; they have the ability to generate additional conversation among participants, producing optimal results, and also can be useful when limitations of time in data collection are an issue (Creswell, 2015; Marshall & Rossman, 2015).

Using the piloted semi-structured interview protocol (see Appendix I), the researcher completed five face-to-face, semi-structured peer focus groups, two focus groups at study sites with higher classroom participation, and one focus group conducted at the remaining study site with 3 participating classrooms. Each school site offered an available empty classroom to conduct the approximately 45-minute peer focus groups. The established interview protocol was used to maintain consistency among the multi-site focus groups and cohesiveness regarding

collected data (Creswell, 2015; Marshall & Rossman, 2015). The researcher served as the

primary facilitator of focus groups, making use of a digital recorder and the application *Smart*

Record to record all sessions. Parental consents and student assents for audio recording were

established prior to focus groups sessions (see Appendix A). The researcher also reminded

students, prior to recording, of the importance and role of audio recordings in the process of

research (Creswell, 2015; Marshall & Rossman, 2015).

In addition to audio recordings, researcher field notes and observations of participants

and setting were carefully noted. According to Marshall and Rossman (2015), words are not the

only critical component to interviews and observation. Researchers must place a high priority on

the collection of all observable behaviors, including a participant's body language or affect and

tone of voice. At the close of each focus group, time was taken to collect researcher reflections

on notable events and observations of the individual sessions. As each focus group was

completed, all focus group audio files were uploaded to a protected cloud-based folder and

shared with a contracted research assistant to be transcribed (see Appendix L).

Analytical Methods

Quantitative analysis. Analysis and interpretation of quantitative data places three major

responsibilities upon the researcher: preparing and organization of collected data, conducting of

statistical evaluations, and the accurate representation and reporting of findings (Creswell, 2015).

The developed Technology Choice & Academic Efficacy Student Perception Survey producing

quantitative data for phase one of this sequential explanatory study was completed by 68.59% of

the study's targeted sample population. This 39 item questionnaire was disseminated to students

through the web-based platform, Qualtrics™. The use of this surveying tool allowed for the swift

and effective transfer of data to Social Package for Social Sciences software (SPSS) for researcher data analysis.

Using SPSS, both descriptive statistics and a frequency analysis were used to investigate data surrounding student perceptions of choice and autonomy in using technology-based platforms during student-centered assessments. Dissecting the data using a frequency analysis allows for identification of the observed frequency of a particular sample (Frey, 2015). This breakdown focuses on mode, allowing for percentages and conclusions regarding student perception to be drawn (Field, 2013; Frey, 2015). During statistical analysis, the researcher examined student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms among upper elementary students. To further explore quantitative connections that exist within the data, a principal components analysis (PCA) was conducted. A PCA provides a summary of empirical data, identifying trends that exist within the larger set of items and reducing the information to correlated "components" or variables (Field, 2013; Jolliffe, 2011; Lever, Krzywinski, & Altman, 2017; Wold, Esbensen, & Geladi, 1987).

Qualitative analysis. Analysis of the study's phase two semi-structured peer focus group data follows the seven phases of analytic procedures typical to qualitative research (Marshall & Rossman, 2015). Transcriptions and field notes were organized, and immersion of data was accomplished through multiple readings and listening of texts. This familiarity with the research data, along with the conceptual framework of the study, led to the development of expected thematic codes (Creswell, 2015; Marshall & Rossman, 2015). The act of coding is not a science and can take on diverse appearances for different researchers (Creswell, 2015; Marshall & Rossman, 2015). However, in an effort to demonstrate consistency and validity, an established

protocol was formed. The focus group transcripts were examined using a deductive thematic analysis employing concepts outlined in the 'Three C's of Data Analysis', a process that aids construction of meaning by moving from codes to categories, and categories to concepts (Lichtman, 2012). The use of annotated analytic memos, highlighting, and marking texts through multiple readings, allowed for not only the recognition of expected codes but also permitted visibility of the unanticipated (Marshall & Rossman, 2015). This six-step process includes initial coding, revising initial coding, developing an initial list based on additional rereading, revisiting categories and subcategories, and finally moving from categories to concepts (Lichtman, 2012). This process, along with the understanding of the study's conceptual and theoretical frameworks, were used to develop themes surrounding student perceptions of choice or autonomy in evidencing learning using self-selected technology-based platforms during student-centered assessments (Creswell, 2015; Marshall & Rossman, 2015). Table 3 summarizes the analytical methods of the study, illustrating what methods were used to answer each proposed research question.

Table 3

Research Questions and Tests

Research Question	Quantitative & Qualitative Test	Independent Variable	Dependent Variable(s)
How does self-selected technology choice impact students' perceptions of student-centered assessments?	Quantitative: - Descriptive - Frequency Analysis - Principal Component Analysis Qualitative: - Peer Focus Groups - Coding	Student's perception of student-centered assessments	Self-selected technology choice
What are students' perceptions of choice in evidencing their learning using technology-based platforms?	Quantitative: - Descriptive - Frequency Analysis - Principal Component Analysis Qualitative: - Peer Focus Groups - Coding	Choice in evidencing their learning using technology-based platforms	Students' perceptions
When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?	Quantitative: - Descriptive - Frequency Analysis - Principal Component Analysis Qualitative: - Peer Focus Groups - Coding	Teacher-driven assessments versus student-centered assessments using technology	Students' perceptions
Are students' perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?	Quantitative: - Descriptive - Frequency Analysis - Principal Component Analysis Qualitative: - Peer Focus Groups - Coding	The ability to self-select a technology-based platform to complete a student-centered assessment	A students' perceptions of personal academic efficacy

Validity and Reliability

Built into the design of this study were intentional and purposeful actions to maximize reliability and validity of the researcher's findings. Throughout the study, multi-faceted structures were initiated to reinforce the dependability of participant data, such as piloting and ensuring validity of the survey instrument, use of triangulation, researcher bracketing, piloted semi-structured interview protocol, and established researcher audit trail (Creswell, 2015; Marshall & Rossman, 2015; Maxwell, 2012)

When a researcher uses multiple methods of research, data sources, or theories to corroborate the findings of a study, it is known as triangulation (Marshall & Rossman, 2015). This recognized practice among researchers not only lends more credibility to a researcher's claims, but also produces a setting in which a subject can be analyzed more accurately, objectively, and with decreased researcher bias (Marshall & Rossman, 2015). In this sequential explanatory mixed-methods research study, the researcher used quantitative survey data and qualitative peer focus group and interview data to aid in the understanding of identified research questions (Creswell, 2009, 2015; Ivankova et al., 2006).

The process of creating a survey, such as the Technology Choice & Academic Efficacy Student Perception Survey, brought with it concerns of validity and reliability. The format of the Technology Choice & Academic Efficacy Student Perception Scale is one familiar to the research field. The self-reporting, Likert-scale response to questions or statements has been used in various studies, allowing participants to express views, perceptions, and attitudes through a continuum of supplied choices (Jamieson, 2004). Along with the instrument's design being founded in prior research, other aspects of usability and validity were also considered. First, the researcher submitted the proposed survey to a nine-person expert panel to review both face

validity and content validity. Care was taken to ensure statements were aimed at appropriate research questions, and that statements would produce data relevant to the presented research questions of the study. Once reviewed, the Content Validity Index (CVI) returned at 94.84%. In review of the survey questions, the nine panel expert panel showed universal agreement of 97.2%. The panel did suggest edits to the survey such as simplification of wording or word choice, sentence structure, redundancy, and question omission, which were all taken into consideration. Second, the researcher piloted the survey with a demographically similar sample group to confirm usability in the current study (Maxwell, 2012). Due to the age of participating students, special attention was taken to confirm readability and understandability of all questions, all the while gauging whether the instrument was collecting the data needed to answer the proposed study questions (Marshall & Rossman, 2015). Feedback from these validation methods was used to make adjustments to the final instrument (Maxwell, 2012).

Statistically verifying validity and reliability within empirical research is essential (Henson, 2001; Mertler, 2016). A Cronbach alpha can be used as part of this process by ensuring an instrument demonstrates internal consistent reliability (Field, 2013; Henson, 2001). Using the pilot data, a Cronbach analysis of all survey Likert-scaled items revealed a high alpha rating of .96. Research question subgroup items of the survey were also statistically examined revealing Cronbach alpha scores well above the established acceptable threshold of .70 (Field, 2013; Tavakol & Dennick, 2011). Research Question 1 items received a Cronbach alpha score of .838. Research Question 2 items received a Cronbach alpha score of .853. Research Question 3 items received a Cronbach alpha score of .772. Lastly, Research Question 4 items received a Cronbach alpha score of .899.

Similar to the quantitative survey, the qualitative semi-structured peer focus group protocol was submitted to an expert panel of three for face validity. The expert panel was asked to review protocol questions, offering feedback on relevance, clarity, and alteration of content regarding the individual question's usefulness in supplying meaningful data to the study's presented research questions. Offered suggestions from the panel included concerns centered primarily around simplified language and the inclusion of follow-up questions within the protocol. These recommendations resulted in the protocol's rewording, offering a more "kid-friendly" approach to the presented questions. Intentional prompts and open-ended follow-up questions were also added throughout the focus group protocol as purposeful reminders to the researcher to focus on the experience of the students in the classroom setting as it relates to the study.

Preceding the study's official semi-structured peer focus group sessions, the interview protocol was piloted with a demographically similar sample group to focus on usability (Creswell, 2015; Marshall & Rossman, 2015). Pilot interview participants were explained their specific role in the study, establishing purpose around the interview protocol's process and usability of questions. It was reiterated that the data gathered during these pilot sessions would not be used for publication, but rather utilized to clarify and refine the instruments used (Creswell, 2015; Marshall & Rossman, 2015).

The use of pilot interviews allows researchers to gain insight not only into themselves as interviewers and researchers, but may also highlight potential obstacles or difficulties that exist within the present study or protocol (Creswell, 2015; Marshall & Rossman, 2015). Questions formulated for the qualitative, semi-structured peer focus groups were piloted with demographically similar sample groups to focus on usability. Due to the age of participants, it

was important that the researcher create as natural of an environment as possible (Marshall & Rossman, 2015). The questions and understandability add to that context. The pilot focus group yielded insights into the protocol's ability to generate responses related to the study's presented research questions. The pilot process also supplied the researcher with opportunities to establish multiple ways to engage the elementary participants in natural conversation, ensuring all student voices were heard in the conversation.

Limitations

No empirical study is without limitations (Marshall & Rossman, 2015). The identification of a study's limitations provides potential connections between the current study and the future recommendation for future studies. Furthermore, recognized limitations can also aid in the understanding and the reader's ability to evaluate how the research findings may be generalized to a different context (Creswell, 2015; Marshall & Rossman, 2015).

One identified limitation to the current study is that reported findings are subject to personal and multiple interpretations. Data collected during the qualitative portion of the study are particularly vulnerable to the bias of the researcher or alternative analysis of other researchers. This potential area of susceptibility can be accounted for and minimized through the use of triangulation during data collection and analysis.

Another limitation of this study revolves around the isolation of the study area. Although three different school sites were used as a part of this research, participating schools resided in two regional school districts, with fourteen of the seventeen classrooms participating from the same district under the same district initiative. This confines the diversity of the sample population. Due to the study's mixed methods design, drawing generalizations from the research is already limited. The restricted population of the study may limit the weight of the researcher's

interpretations and conclusions. The intentional sampling of focus group participants, along with multiple school study sites and variation of district implementation, were all used to inject as much student voice and experience as possible into the collected data and analysis of this research.

Surveying and interviewing minors allows for researchers to gain first-hand experiences of how children view and interact in a particular context (Marshall & Rossman, 2015). However, a minor participant's age and the use of self-reporting data can be viewed as a limitation. Expert review and piloting of study instrumentation, the survey, and the focus group protocol not only aid in verifying validity, reliability, and usability, but were also used to minimize the impact of participant age in the self-reporting process of this study.

Bias is not something to be ignored by the researcher (Creswell, 2015; Marshall & Rossman, 2015). Instead, a researcher should acknowledge their biases, specifying and clarifying them throughout the study (Creswell, 2009; Marshall & Rossman, 2015). To address the concern of researcher bias, the use of bracketing was utilized to allow the researcher to acknowledge where personal understanding or perceptions may impede impartiality to collected data (Marshall & Rossman, 2015). The transparency of a researcher doesn't stop there. Audit tails, a technique of clearly outlining and reporting for any data and decision-making during the research process, demonstrates substantiation or researcher decisions in the field (Marshall & Rossman, 2015). The researcher increases trustworthiness in the current study by generating a systematic approach to the data collection process, including evidence of researcher logic leading to key decisions and findings (Marshall & Rossman, 2015).

Role of the Researcher

One of the major threats to the validity of a study can be the researcher's own biases (Maxwell, 2012). Although one cannot fully remove the "perceptual lens" or bias brought to a specific topic, one can design for minimizing its potential influence on the study's conclusions (Maxwell, 2012). At the time of this study, the researcher served as an Assistant Professor in Graduate Education at a private Christian university. With most courses focused around curriculum, instruction, and innovation, and experience as an innovation specialist and 1:1 learning environments, engagement in topics of instruction that may be considered forward-thinking is a common occurrence. Over the last six years, the topic of innovation in education has been the consistent driver of the researcher's career. This passion has generated an advocacy to see personalization and 21st century skills as foundational instructional strategies of the mainstream classroom, helping to support the unique individual needs of all learners. In this study, the researcher's data does not address or analyze the success or effectiveness of the district's initiative, but rather the data adds to the lack of existing knowledge surrounding research-based instructional practices implementing 21st century skills, specifically elementary student perceptions of choice in evidencing learning using technology-based platforms.

Chapter IV

Results

Introduction

There is a strong disconnect between the evolving needs of modern day society and the traditional educational system largely in existence today (Aslan & Reigeluth, 2013; Grant et al., 2014; Henriksen et al., 2016; Horn et al., 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012; Wright & Jones, 2018). These societal shifts require students to master traditional core subject area knowledge, as well as demonstrate 21st century competencies (Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Nisha & Rajasekaran, 2018; P21, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013). Although educational stakeholders can agree on the need to integrate 21st century curriculum, discourse among patrons exists in establishing what competencies best contribute to a student's success and the integrating of intentional instructional practices (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Carver, 2016; Ellis, 2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013).

Literature recognizes that 21st century competencies and skills can be fostered in the classroom through purposeful use of online tools, platforms, and applications. These tools enhance student learning by offering multiple pathways to process information. As a result, student learning can be demonstrated using various platforms of the learner's choice (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Pahomov, 2014; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). Current research concludes that the use of choice and autonomy during student-centered assessments positively

influences student performance, engagement, self-efficacy, and motivation (Aslan & Reigeluth, 2013; Clark, 2012; Ellis, 2012; Gillard et al., 2015; Núñez & León, 2015; Thompson & Beymer, 2015). Empirical research concerning pedagogical practices involving intentional integration of 21st century competencies is scarce. Even more absent are studies that highlight the elementary student's perception and capacity to engage in choice when evidencing knowledge using self-selected technology-based platforms. The purpose of this mixed methods study was to examine student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms among upper elementary students.

This mixed methods study utilized an explanatory sequential design. An explanatory sequential design analyzes both forms of data but in a purposeful "sequential" manner (Creswell, 2009, 2015; Ivankova et al., 2006). Quantitative data was first gathered and assessed through the use of the researcher created Technology Choice and Academic Efficacy Student Perception Survey. Driven by the quantitative findings, qualitative data was collected by means of student peer semi-structured focus groups. This dissertation was guided by the following questions:

1. How does self-selected technology choice impact students' perceptions of student-centered assessments?

2. What are students' perceptions of choice in evidencing their learning using technology-based platforms?

3. When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?

4. Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?

Providing further direction to the researcher was the inclusion of the Partnership for 21st Century Skill's *P21 Framework for 21st Century Learning* as a theoretical framework. The *P21 Framework for 21st Century Learning* has identified essential structures educational institutions need in order to design and support relevant instructional environments for students in current society (P21, 2015; Trilling & Fadel, 2012). The framework emphasizes the need for core subject knowledge, interdisciplinary engagement with 21st century learning themes, learning and innovation skills, understanding of 21st century literacies, and necessity of life and career skills (P21, 2015; Trilling & Fadel, 2012).

The purpose of Chapter IV is to provide results of quantitative survey data for each of the study's presented research questions and qualitative findings from conducted peer focus groups. Gathered results for quantitative data will be detailed throughout this chapter, question by question, in an effort to clarify outcomes of the study. Qualitative findings and themes will be presented holistically. Offering additional context to the results, details of the study's methodology and design are included.

Data Collection Instruments

Survey instrument. The researcher-created, 39-itemed, Technology Choice & Academic Efficacy Student Perception Survey (see Appendix J) was used in phase one of this study. The first three items of the survey centered around basic demographics of the student participants, such as gender, ethnicity, and years in classroom with an assigned 1:1 device, while the following 34 items collected Likert-scaled, quantitative data on each of the study's presented research questions. A participant's classroom and grade was identified by an independent link or QR code by which the survey was accessed. The Technology Choice & Academic Efficacy Student Perception Survey assessed students' perceptions of four sub grouped areas: 1) self-

selected technology choice during assessments, 2) choice and evidencing learning using technology-based platforms, 3) teacher-driven versus student-centered assessments, and 4) whether personal academic efficacy is affected by the ability to self-select and use technology-based platforms during assessments. The questions were administered to participants in a combined/mixed pattern using 5-point Likert scale classifications of 5-Very Much Agree, 4-Agree, 3-Neither Agree or Disagree, 2-Slightly Disagree, or 1-Very Much Disagree. The final two questions of the survey spoke to the student's openness of participating in the study's site-based focus groups by asking the participant's interest and collecting the student's full name. Due to the innovative 1:1 landscape of the participating schools, the survey was accessed digitally through the platform Qualtrics™, using a shortened URL typed into an internet browser or by scanning a QR code with a device.

Interview protocol. As per explanatory sequential study design, both literature and quantitative survey data from phase one of the study were used to create a semi-structured, peer focus group protocol (Creswell, 2009, 2015; Ivankova et al., 2006). The interview protocol underwent an expert panel review, as well as a pilot process with students of a similar sample demographic. This piloted protocol (Appendix I) was used by the researcher to facilitate five face-to-face focus group sessions across the three separate study sites. This process allowed for consistency and cohesiveness of collected data (Creswell, 2015; Marshall & Rossman, 2015).

Participant Profile

Survey participants. The Technology Choice & Academic Efficacy Student Perception Survey was distributed to 297 purposefully-selected student participants. Participants were identified as part of the larger targeted sample of 433 fourth- through sixth-grade students exposed to autonomous attributes, instructional practices, and a 21st century learning

environment. The following criterion was developed and used to defend purposeful decisions by the researcher regarding specific selections of study sites and participants (Creswell, 2015):

- Students were enrolled in schools that maintain a 1:1 classroom learning environment. For the purpose of this study, the term 1:1 is used to describe a specific learning environment involving the use of educational technology such as a laptop, netbook, tablet, or mobile learning device. This ratio signifies that one device was available for every one student in the classroom (Great Schools Partnership, 2013).

- Students were enrolled in schools and/or classrooms where teachers had participated in a minimum of 20 hours of professional development focused on building technology capacity of teachers and students through the use of multiple technology-based platforms to complete assessments or evidence learning.

- Students were enrolled in schools and/or classrooms where educators were trained to include instructional strategies on developing student's personal choice and autonomy in completing assessments or evidencing learning.

- Students were enrolled in schools and/or classrooms where they were given one or more opportunities a week, either individually or collaboratively, to self-select a technology-based platform to complete assessments or evidence learning outcomes.

The study extended across three elementary schools and two Pacific Northwest school districts. Although varying in focus, both participating school districts introduced 1:1 learning initiatives focused on creating student-centered, 21st century learning environments in 2016. Each of the initiatives met the elements of the study's criterion and incorporated choice and autonomous structures into instructional practices and assessments.

District #1 profile. The first participating school district is considered semi-rural and serves approximatively 14,000 students. This district contributed two elementary sites to the study, noted as "District #1/Site #1" and "District #1/Site #2." While both elementary sites are involved in the district's 1:1 initiative, they vary in both instructional focus and experience with devices. The District #1/Site #2 elementary school involved 134 fourth- and fifth-grade students across 4 fourth-grade classrooms and 4 fifth-grade classrooms. This school started with 1:1 devices in 2016 as a part of the initial launch of the district's initiative and uses Project-Based Learning (PBL) as the primary mode of instructional delivery. The partnering study school in this district, District #1/Site #1, supplied 108 fourth- and fifth-grade students as participants. These learners came from 2 fourth-grade classrooms and 3 fifth-grade classrooms. This elementary site was part of the second phase of schools to become 1:1 in the district, receiving devices in 2017. Therefore, faculty and staff have a year less experience in building blended teaching and learning practices within their building. While students are assigned an individual device as part of the district's 1:1 initiative, elementary students were not permitted to take devices home from school.

District #2 profile. The second district offering participants to this study, noted as "District #2/Site #1," is classified as a rural school district serving around 500 students. Participants at this site were housed on one school site in a fourth-grade, fifth-grade, and sixth-grade classroom. Much like the other sites, a district 1:1 initiative was introduced in the fall of 2016. While the districts shared many of the same reasons for their individual initiatives, the instructional approaches vary. Using a personalized learning approach, instruction centers around individual students and mastery. Students are assigned an individual device and are free to take this device home with them, offering anytime, anywhere learning. Student demographics and

populations among the participating classrooms varied not only in size, but also in student ethnicity and social economic status, as measured by reported free and reduced lunch percentages (See Table 1). Over seventy-five percent (75.2%) of District #1 participants were classified as white with Free and Reduced Lunch rates at 35.8% and 46.3%. The reverse was true for District #2. Participants classified as white made up only 23.6% of the study population, and the school's Free and Reduced Lunch rate was reported at 100%.

The researcher received parental consent forms for 301 (70%) of the 433 eligible students. The study yielded involvement of 68.59% (or 297 of 433) of the potential student sample. Of the 297 participants, 133 (44.78%) were fourth-grade students, 141 (47.47%) were fifth-grade students, and 23 (7.74%) were sixth-grade students. Table 4, *Participant Demographic Data by Site*, highlights the equal involvement of genders within the study (150 females and 147 males), student grade-level participation and ethnicity, as well as the individual study site participation percentages. The researcher accessed the participants in person with scheduled survey times coordinated with each individual study classrooms. Eligible students who were absent on the day of the scheduled survey did not participate, and were therefore made ineligible for the qualitative phase of the study which followed.

Table 4

Survey Participant Demographic Data by Site

	District #1 Site #1	District #1 Site #2	District #2 Site #1
Sample Size			
Fourth Grade	43	73	17
Fifth Grade	65	61	15
Sixth Grade	0	0	23
Gender			
Male	51	66	30
Female	57	68	25
Student Ethnicity			
White	80	102	13
Hispanic	20	17	39
Black/African American	1	3	0
Asian	2	1	0
Native American & Native Hawaiian	1	2	2
Other (Multiple Races & Unclassified)	4	9	1
Percentage of Potential Population Overall Percentage: 297/433=68.59%	108/136=79.4%	134/223=60.1%	55/74=74.3%
Free and Reduced Lunch of School Population	35.81%	46.32%	100%

Note: Names of districts and schools have been omitted to protect anonymity of participants.

Interview participants. Phase two of the study used multiple sampling methods to select 39 participants to be involved in qualitative focus groups. First, involvement in the semi-structured, peer focused groups was voluntary and criterion-based. Using the last two questions of the Technology Choice & Academic Efficacy Student Perception Survey, the researcher was able to collect names of volunteer focus group participants, while at the same time limiting the involvement to only students contributing to phase one of the study (Marshall & Rossman,

2015). Second, purposeful sampling was used to ensure that focus groups were representative and maintained characteristics of the overall study sample (Creswell, 2015; Palinkas et al., 2015). Using a site-based list of eligible volunteer students, teachers of the participants worked to establish mixed-classroom focus groups that mirrored the overall demographics and diversity of the study population, paying close attention to aspects of gender, ethnicity, and disposition of learner.

As part of phase two, five face-to-face, semi-structured peer focus groups were conducted among the three participating school sites. One mixed grade-level focus group was held in District #2/Site #1, with participants from fourth, fifth, and sixth grade. Students represented each of the three study classrooms involved at this participating site. At District #1/Site #1 and District #1/Site #2, two grade-level specific (fourth-grade and fifth-grade) focus groups occurred due to increased classroom/participant involvement. The researcher-led focus groups took place three to four weeks after the quantitative survey and were approximately 45 minutes in length, with the shortest focus group lasting 43 minutes and 38 seconds and the longest lasting 50 minutes and 19 seconds. Similar to phase one survey participants, gender among the overall focus group participants was generally even, with 19 males and 20 females. As seen in Table 5, although not all survey populations are represented, even within limited focus group sizes of seven to eight, the participants exhibit diversity. Among the 39 participants, students included 18 (46.15%) fourth-graders, 18 (46.15%) fifth-graders, and 3 (7.69%) sixth-graders. This grade-level distribution is comparable to the phase one quantitative sample, adding to the researcher's attention to maintain similarities to original study population.

Table 5

Focus Group Participant Demographics & Grade Level Data by Site

	District #1 Site #1 F.G. #1	District #1 Site #1 F.G. #2	District #1 Site #2 F.G. #1	District #1 Site #2 F.G. #2	District #2 Site #1 F.G. #1
Size of Group	8	7	8	8	8
Grade Level					
Fourth Grade	8	0	8	0	2
Fifth Grade	0	7	0	8	3
Sixth Grade	0	0	0	0	3
Gender					
Male	6	4	3	3	3
Female	2	3	5	5	5
Student Ethnicity					
White	7	3	5	4	2
Hispanic	0	3	1	3	4
Black/African American	0	1	0	1	0
Asian	0	0	0	0	0
Native American & Native Hawaiian	0	0	0	0	0
Other (Multiple Races & Unclassified)	1	0	2	0	2
Free and Reduced Lunch	*58%	*58%	*58%	*58%	100%

Note: Names of districts and schools have been omitted to protect anonymity of participants. The *%, notes the overall free and reduced lunch rate for the 31 participating students in District #1.

All focus groups were conducted face-to-face by the researcher using the piloted semi-structured protocol (Appendix I). Students contributed to focus groups held at their home study sites. Dates and times of focus groups were coordinated with classroom teachers during normal school hours to minimize disruption to the participating students. Parental consents were completed, signed, and confirmed by researcher prior to students being eligible as potential focus group candidates.

Survey Validity and Reliability

No matter the research design, a researcher must ensure validity and reliability of collected data (Creswell, 2016; Mertler, 2016; Roberts, Priest, & Traynor, 2006). In creating the Technology Choice & Academic Efficacy Student Perception Survey, issues of validity and reliability were addressed with intentional and strategic decisions from the onset of the study's design (Mertler, 2016; Roberts et al., 2006).

Content validity index expert panel. The developed structure of the Technology Choice & Academic Efficacy Student Perception Survey was purposeful. The use of self-reporting, Likert-scaled statements to allow people to report their views, perceptions, or attitudes has become a customary practice in the research setting (Jamieson, 2004). With the survey design established, qualities that incorporate usability and validity must also be assessed. Determining content validity establishes the extent a particular instrument will assess or measure the intended "interest" or research question (Bolarinwa, 2015). To aid in this analysis, a content validity index (CVI) was conducted using "construct" or subject experts acting as inter-raters and reviewers of the presented instrument (Bolarinwa, 2015; Polit & Beck, 2006). The researcher made great efforts to diversify the nine-person expert panel in order to benefit from assorted perspectives and expertise. As Table 6 demonstrates, authorities participating in the CVI analysis came from both the private and public sectors of education, varied in professional experiences and backgrounds, and offered diverse years of experience.

Table 6

Demographics of Content Validity Index Expert Panel - Survey

	Gender	Position	Institution	Years of Experience
Expert 1	Male	Innovation Specialist/Asst. Superintendent	Public Education	16-20 years
Expert 2	Female	Former Elem. Teacher/ Innovation & Instructional Specialist	Public Education	6-10 years
Expert 3	Male	Director of Innovation Center	Private Liberal Arts University	21-25 years
Expert 4	Male	Technology Integration Specialist	Public Education	16-20 years
Expert 5	Female	Former Elem. Principal/ Educ. Consultant	Private Educational Contractor	45+ years
Expert 6	Female	Elem. Instructional Coach (1:1 School)	Public Education	21-25 years
Expert 7	Female	Instructional Specialist/Asst. Professor	Private Liberal Arts University	16-20 years
Expert 8	Female	Instructional Specialist/Asst. Professor	Private Liberal Arts University	16-20 years
Expert 9	Female	Instructional Design & Technology	Private Liberal Arts University	6-10 years

Once each expert was identified, the researcher emailed the CVI to individual panel members. Using Excel, the survey questions, directions, a place for individual comments, and timeline for completion were provided. The experts were asked to provide a 4 though 1 rating on the strength of the question in relation to the relevance of the study question, with 4 (Very Relevant, No modifications needed), 3 (Quite Relevant, No modifications needed but could be improved with minor changes), 2 (Somewhat Relevant, Some modifications needed), and 1 (Not Relevant) (Polit & Beck, 2006). Elements of face validity were also added to this analysis by

asking the panel to offer further comments or alterations on word choice or other clarifications that would produce a better outcome.

Content validity index results. The results of the content validity index were positive (see Appendix M), with the expert panel affirming that content included within the Technology Choice & Academic Efficacy Student Perception Survey was relevant to each of the intended research questions (Bolarinwa, 2015). It is important to note, face validity and suggested feedback was received from the expert panel on the quantitative survey's demographic questions, but demographic questions were not included in the content validation or the reported results. The first CVI calculation reconsidered by researcher is referred to as the S-CVI, content validity index for scales. The S-CVI provides the researcher with the content validity of the overall scale. A researcher can calculate this by averaging the I-CVIs, or content validity scores, of each individual item in the scale (Polit & Beck, 2006). When reviewed, the evaluations returned an S-CVI of 94.84%, well above the acceptable .80 identified for a panel and scale of this size (Polit & Beck, 2006). The expert panel S-CVI/UA (content validity index universal agreement), the percentage of questions from the scale deemed relevant to the study, was assessed at 97.14%. Although guidelines vary in what is acceptable regarding S-CVI/UAs, a generalized recommendation is .90 (Polit & Beck, 2006).

Research suggests that content validity index for items (I-CVI) should not dip below the .8 guideline with a panel size of 6 to 10 experts (Polit & Beck, 2006). One proposed survey statement did fall below this threshold (77.8 I-CVI), with 2 of the 9 experts marking the statement irrelevant without revision. The statement read, "Sometimes, being able to choose how to show what I know on my device can be hard, but overall it is worth it." Many of the experts, including some who marked the question relevant, voiced concerns regarding the wording and/or

phrasing of the statement, and whether the statement was asking the student to respond to more than one embedded topic. The researcher used suggested phrasing from the experts to revise the survey statement. The statement was then reviewed with two of the contributing experts and approved to be included on pilot survey. Although given an I-CVI of 88.8, the statement "I can get good grades when my teacher lets me choose for myself how to complete my assignments on my device" was omitted from the survey. This decision was based on discussion from the panel on whether the term "grades" was relevant to my question, and how this individual statement related to sites that build mindsets of mastery, competency, or standards-based learning.

Survey pilot. The act of piloting can provide invaluable information to the researcher regarding instrumentation and data collection processes (Creswell, 2015; Maxwell, 2012; Mertler, 2016). Using a like demographic sample, the researcher established usability of the survey among the established study population (Creswell, 2015; Maxwell, 2012; Mertler, 2016). The selected fifth-grade pilot classroom was housed at a school that met established criterion for selection of sites within the study and offered many dynamics of the participating classrooms. Table 7 demonstrates the pilot school's like size to District #1 of the study, while representing elements of diversity and socioeconomic status of participating District #2. As mentioned, the pilot classroom is a 1:1 environment, where students have been instructed using autonomous-based structures.

Table 7

Survey Pilot Participant Demographics

	District #1 Site #1
5th Grade Sample Size	29
Gender	
Male	9
Female	20
Student Ethnicity	
White	10
Hispanic	11
Black/African American	0
Asian	0
Native American & Native Hawaiian	1
Other (Multiple Races & Unclassified)	7
Total Enrollment of Pilot School	514
Pilot School % of Free & Reduced Lunch	100%

Note: Names of districts and schools have been omitted to protect anonymity of participants.

The researcher administered the survey to pilot participants on site. Using young participants, special care was given to verify the instruments readability and understandability, as well as to evaluate the survey's ability to gather the needed data for the proposed research questions (Marshall & Rossman, 2015). The researcher noted the time it took for students to complete the survey and specific questions that were asked by students during data collection. This information, along with statistical data, was considered when modifying the final instrument (Creswell, 2015; Maxwell, 2012; Mertler, 2016).

Cronbach's Alpha of pilot survey. Verifying internal consistency reliability of study tools and instruments is a vital part of the research process (Henson, 2001; Mertler, 2016). When testing internal consistency reliability, the analysis centers around whether items or a group of

items show uniformity throughout the instrument (Field, 2013; Henson, 2001). One common statistical measure to determine internal consistency in Likert-scaled items is Cronbach's alpha (Field, 2013). Although acceptable Cronbach alpha levels are debated in research, literature agrees that a higher alpha score is indicative of greater internal consistency of an instrument (Field, 2013; Tavakol & Dennick, 2011). Likewise, a lower alpha score can signal internal reliability issues within an instrument (Field, 2013). A Cronbach alpha level of .70 (œ > 0.70) or higher is generally considered acceptable within the research field (Field, 2013; Tavakol & Dennick, 2011).

The researcher identified a like population to conduct a survey pilot to ensure internal consistency reliability within the Technology Choice & Academic Efficacy Student Perception Survey instrument used in phase one of data analysis. A Cronbach of all survey Likert-scaled items revealed a high alpha rating of .96. Research question specific, sub-grouped items of the survey were also statistically examined revealing Cronbach alpha scores well above the established .70 (œ > 0.70) threshold (Field, 2013; Tavakol & Dennick, 2011). Research Question 1 items received a Cronbach alpha score of .84 (œ = 0.838). Research Question 2 items received a Cronbach alpha score of .85 (œ = 0.853). Research Question 3 items received a Cronbach alpha score of .77 (œ = 0.772). Lastly, Research Question 4 items received a Cronbach alpha score of .90 (œ = 0.899).

Cronbach's Alpha of final survey. Confirming statistical viability presented in empirical research is critical to supporting the validity and reliability of study findings (Henson, 2001; Mertler, 2016). Upon completion of phase one data collection, Cronbach's alpha was used to analyze internal consistency of the gathered quantitative survey results (Field, 2013; Henson, 2001). The initially generated alpha score examined all 34 ordinal items of the Technology

Choice & Academic Efficacy Student Perception Survey. The overall instrument's internal

consistency was strong, with a reported alpha of .92 (œ = 0.918). Following the same process as

the pilot, Cronbach's alpha was used to assess each of the survey's subgroups, with three of the

four subgroups reporting alphas above the .70 (œ > 0.70) acceptable guideline, Research

Question 1 Items = .74 (œ = 0.742), Research Question 2 Items = .73 (œ = 0.726), and Research

Question 4 Items = .82 (œ = 0.821) (Field, 2013; Tavakol & Dennick, 2011). Research Question

3 Items revealed an initial alpha just under the accepted threshold at .69 (œ = 0.697). When

further investigated, the SPSS *Item-Total Statistics* report showed one item, that if deleted, would

raise the internal consistency of this grouping to .71 (œ = 0.707). With an adequate amount of

other items to properly inform the presented study question, the researcher made the decision to

remove item RQ3.Q11 from the survey results. All reported findings and conclusions presented

in Chapter IV and Chapter V will be reflective of this change. This item deletion did not affect

the overall internal consistency of the survey as a whole. When reexamined, the now 33-itemed

survey's overall Cronbach alpha remained consistent at .92 (œ = 0.918).

Semi-Structured Peer Focus Group Protocol Validity and Reliability

When combining data collection strategies and multiple forms of instrumentation, a

researcher needs to be cognizant of issues surrounding validity and reliability (Creswell, 2016;

Mertler, 2016). Intentional actions were taken to produce a semi-structured peer focus group

protocol that would supply the needed data to proposed study questions, while maintaining

cohesiveness of selected study design and protection of involved minor focus group participants.

Content expert panel. An expert panel of three was recruited to review the qualitative,

semi-structured, peer focus group protocol for face and content validity. Stemming from the

initial panel of nine who offered feedback on the quantitative survey, these experts were asked to

supply constructive suggestions on the qualitative protocol's relevance, clarity, and alteration of content regarding the individual question's usefulness in supplying meaningful data to the study's presented research questions. The content of the proposed protocol was met with expert agreement. Suggestions resulting in various rewording of questions were made in an effort to provide more "kid-friendly" vocabulary and phrasing. The experts also encouraged the researcher to embed additional prompts and conversational probes within the focus group protocol as intentional cues to maintain focus on the student's experiences as they pertained to the study questions. Table 8 displays the demographics of the individuals involved in this process, along with the professional background and experience each offered the researcher.

Table 8

Demographics of Content & Face Validity Experts – Focus Group Protocol

	Gender	Position	Institution	Years of Experience
Content Expert 1	Male	Innovation Specialist/Asst. Superintendent	Public Education	16-20 years
Content Expert 2	Female	Former Elem. Teacher/ Innovation & Instructional Specialist	Public Education	6-10 years
Content Expert 3	Male	Director of Innovation Center/Innovative Schools Specialist	Private Liberal Arts University	21-25 years

Semi-structured peer focus group pilot. The piloting of a semi-structured interview protocol can help clarify the strength and deficiencies that exist within the protocol instrument (Creswell, 2016; Mertler, 2016). Piloting interview protocols provides valuable insights that reach beyond the instrument. Researchers gain experience and self-awareness regarding interview methods and the population involved in the study (Creswell, 2015; Marshall & Rossman, 2015). Pulling from the previously identified quantitative pilot sample, the researcher

asked the participating pilot teacher to select eight students who represented the diversity of the

overall classroom in areas of ethnicity, socioeconomic status, and the various levels and

dispositions of learners. Table 9 displays the demographics of the students involved in the peer

focus group pilot.

Table 9

Pilot Focus Group Participant Demographics

	District #1 Site #1 F.G. #1
Size of Group	8
Grade Level	
Fourth Grade	0
Fifth Grade	8
Sixth Grade	0
Gender	
Male	5
Female	3
Student Ethnicity	
White	4
Hispanic	4
Black/African American	0
Asian	0
Native American & Native Hawaiian	0
Other (Multiple Races & Unclassified)	0
Free and Reduced Lunch	100%

As a result of the age of the pilot participants, the researcher focused on creating a natural

environment for the focus group, arranging with the school to use a classroom on site (Marshall

& Rossman, 2015). The students were reminded of their role in the study, as well as the focus

group's process and purpose, to clarify and refine the interview protocol and data collection process (Creswell, 2015; Marshall & Rossman, 2015). The pilot produced understanding of the protocol's capacity to provide student data, aiding the researcher in answering the study's questions. The researcher also had opportunity to determine effective strategies for engaging the study population in natural conversation, with intention around all voices being heard.

Quantitative Results

As per design, quantitative survey results were analyzed during phase one of the study. Using SPSS, the researcher examined the quantitative data through the use of frequency and principal component analysis. Frequency statistics focused on mode, allowing for conclusions to be drawn regarding a participant's perception of the study's topics (Field, 2013; Frey, 2015). The "Reported Frequency" in Table 10- Table 14 are representative of students who marked "Very Much Agree" or "Agree" on a specific survey item. Responses of "Neither Agree nor Disagree" are considered neutral and therefore not scored towards either direction.

Results for Research Question 1: Technology Choice & Student Perception of Assessment

The first question presented in this study was "How does self-selected technology choice impact students' perceptions of student-centered assessments?" Seven questions were used in the subset to assess how self-selected technology choice impacted student's perceptions of student-centered assessments. Three of the seven questions directly addressed the students' perception of engaging in assessments when given the opportunity to self-select technology. Over 85% (85.2% or 253 out of 297) of students perceived their assignments to be more enjoyable when given choice in how they finished work using their device. Furthermore, 76.8% (or 228 out of 297) of these students believed this choice on their device made assignment completion more exciting, and 73.1% (or 217 out of 297) found the assignment more interesting.

The remaining four questions assessed a student's perceptions of learning during an assessment when given the opportunity to self-select technology. Students reported that having self-selected technology choice in assessment completion not only helps them do their best work (71.4% or 212 out of 297) but also makes them feel in charge of their learning (70.4% or 209 out of 297). Almost 70% (69.7% or 207 out of 297) of surveyed students perceived they can reach their learning goals when teachers allow for choice of technology in completion of assignments using a device. The majority of students (63% or 187 out of 297) believed this process allows them to learn more during the completion of their assignments. Table 10 displays the survey questions used for research question 1, along with frequency results for all categories.

Table 10

Survey Frequency Results: Research Question 1

Survey Question	Reported Frequency (Very Much Agree/Agree)	Very Much Agree	Agree	Neither Agree nor Disagree	Slightly Disagree	Very Much Disagree
When I have an assignment, choosing how I will finish my work on my device makes my work more enjoyable.	**85.2**	**36.7**	**48.5**	**11.1**	**3**	**0.7**
Being able to choose how to complete an assignment on my device makes me feel like I'm in charge of my learning.	70.4	27.9	42.4	20.5	6.7	2.4
Using the platform I want to use on my device helps me to do my best work.	71.4	35.7	35.7	17.5	8.4	2.7
I can reach my learning goals when my teacher lets me choose for myself how to complete my assignments on my device.	69.7	27.9	41.8	20.9	5.7	3.7
When I am able to choose how to finish my assignment on my device, I feel like I learn more.	63	27.3	35.7	22.6	9.8	4.7
When I get to choose how to show my work on my device, it makes the assignment more interesting.	73.1	34	39.1	17.2	8.1	1.7
It's exciting when I get to choose for myself how to complete my assignment on my device.	**76.8**	**36**	**40.7**	**15.5**	**5.7**	**2**

Note: "Reported Frequency" is representative of students who marked "Very Much Agree" or "Agree" on the individual survey item. Bold font indicates significance of .75 or greater for the survey item used in principal component analysis.

Results for Research Question 2: Student Perception of Choice & Learning Using Tech

        The second listed question of the study explores "What are students' perceptions of choice in evidencing their learning using technology-based platforms?" Frequencies were used to explore quantitative findings through the use of SPSS. The second subset of nine questions in the Technology Choice & Academic Efficacy Student Perception Survey focused on a student's perception of having "choice" in evidencing learning through the use of devices. Two questions of this subgroup directly addressed a student's desire to use devices to complete school work. Two-thirds (66.3% or 197 out of 297) of students reported they would rather use their device than other mediums, such as paper and pencil. Likewise, three-fourths (75.1% or 223 out of 297) agreed or very much agreed to liking school work best when they have the choice to use a device for assignment completion.

        The survey results indicated that students perceive value in having the choice of individual platform usage during assignment completion. All five questions in this subset specifically assessed aspects of choice and platform and showed that participants agree or very much agree at rates over 75% (See Table 11). For example, 255 of 297 students (85.9%) indicated that when given choice, they can choose a platform that will show their best work. Students also suggested that platform choice is not something they make lightly, with 83.8% (or 249 out of 297) noting that platform selection is something students consider carefully. While 81.1% (or 241 out of 297) of students tend to use platforms in which they feel confident, the students also place significance on creativity. Overwhelmingly (84.8% or 252 out of 297), students indicated the use of a platform because it allows them to be creative in the completion of their assignments, with over 51.5% (or 153 out of 297) marking "very much agree."

      The last two questions were intended to address how a student's perception of having choice on their devices impacts their learning. The majority of the responding students (57.9% or 172 out of 297) stated they learn better when using devices on assignments. The added choice of using a device does factor into how students perceived evidencing learning. Almost 78% (77.8% or 231 out of 297) of students acknowledged that the available choice to use a device on school work allows them to better show what they know to their teachers.

Table 11

Survey Frequency Results: Research Question 2

Survey Question	Reported Frequency (Very Much Agree/Agree)	Very Much Agree	Agree	Neither Agree nor Disagree	Slightly Disagree	Very Much Disagree
When I am working on an assignment, I would rather use my device than something else like paper and pencil.	66.3	39.1	27.3	17.8	12.5	3.4
I like my school work best when I can choose to use my device to complete assignments.	**75.1**	**38.4**	**36.7**	**14.1**	**8.4**	**2.4**
On my device, I like to choose what platform to finish my assignment in.	**78.8**	**38.4**	**40.4**	**15.2**	**5.1**	**1**
I will choose a platform for my assignment because it allows me to be creative.	**84.8**	**51.5**	**33.3**	**11.8**	**2.4**	**1**
When completing my work on my device, I choose only the platforms that I know I am good at using.	**81.1**	**47.1**	**34**	**11.8**	**5.1**	**2**
When given the chance, I know I can choose the best platform on my device to show my best work.	**85.9**	**41.1**	**44.8**	**9.1**	**5.1**	**0**
I learn better when I get to use my device on an assignment.	57.9	25.3	32.7	26.6	10.4	5.1
Getting a choice to use my device on my school work allows me to better show what I know to my teacher.	**77.8**	**31**	**46.8**	**15.8**	**4**	**2.4**
When I get to choose, I think carefully about what platform will show my best work on my device.	**83.8**	**40.4**	**43.4**	**11.1**	**4**	**1**

Note: "Reported Frequency" is representative of students who marked "Very Much Agree" or "Agree" on the individual survey item. Bold font indicates significance of .75 or greater for the survey item used in principal component analysis.

Results for Research Question 3: Teacher Driven vs. Student-Centered Assessments

"When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?" This was the third question posed within the current study. Again, frequencies were used to explain the quantitative survey findings through the use of SPSS. The Technology Choice & Academic Efficacy Student Perception Survey's third subset contained six questions centered around student perceptions of teacher-driven assessments vs. student-centered assessments when completing assignments using technology-based platforms. Two questions of the subset dealt directly with student perception's regarding who they preferred to make decisions when it came to assignments completion on devices. Almost 70% (69.7% or 207 out of 297) indicated they would rather choose the platform to complete their work than have the teacher dictate which one must be used. When stated differently, "I like to choose what platform to use, rather than someone else tell me what platform to use," 79.1% (or 235 out of 297) of surveyed students preferred this option.

An additional two questions of the subset addressed student perceptions of teacher-driven vs. student-centered technology-based assessments and the impact on elements of engagement. Participant responses suggested that technology-based, student-centered assignments are not only more enjoyable than teacher-directed assignments (79.5% or 236 out of 297), but also that student-centered choice in assignments using devices keeps assigned work from being perceived as "boring" (69% or 205 out of 297). The remaining two questions of this subset evaluated a student's perception of teacher-directed vs. student-centered technology-based assessment's influence on their learning. While almost 60% (59.3% or 176 out of 297) of upper elementary students indicated they learn more when they choose for themselves how to evidence their learning, a reported 75.3% (or 223 out of 297) perceived completion of student-centered

technology-based assignments as a vehicle to show their very best work. Table 12 highlights the

results of research question 3's frequencies for all survey items and categories.

Table 12

Survey Frequency Results: Research Question 3

Survey Question	Reported Frequency (Very Much Agree/Agree)	Very Much Agree	Agree	Neither Agree nor Disagree	Slightly Disagree	Very Much Disagree
I like to choose what platform to use, rather than someone else tell me what platform to use.	**79.1**	**51.9**	**27.3**	**13.1**	**4.7**	**3**
I learn more when I can choose how to show my work rather than the teacher telling me what to do.	59.3	30	29.3	22.9	10.4	7.4
On my device, I would rather choose the platform to finish my work then have the teacher tell me which one I have to use.	69.7	38.4	31.3	19.2	8.4	2.7
When we use our device, I enjoy the assignment more when I have a choice in how to complete the work.	**79.5**	**35**	**44.4**	**13.5**	**4**	**3**
Choosing how to complete my assignments on my device keeps my work from being boring.	69	36.4	32.7	21.2	6.7	3
Being able to choose for myself how to complete my assignments on my device lets me show my very best work.	**75.3**	**29.1**	**46.3**	**17.2**	**5.7**	**1.7**

Note: "Reported Frequency" is representative of students who marked "Very Much Agree" or "Agree" on the individual survey item. Bold font indicates significance .75 or greater for the survey item used in principal component analysis.

Results for Research Question 4: Academic Efficacy & Tech Choice in Assessments

The last question addressed in the study centered around, "Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?" In a similar pattern as the other presented research questions, using SPSS the researcher first examined the quantitative survey data through the lens of frequency. The final subset of eleven questions in the quantitative survey considered self-selected technology use to complete assignment/assessments and whether this choice specifically impacted a student's perceived academic efficacy. Four of the items asked students to address efficacy through the lens of academic mindsets. Almost 61% (60.9% or 181 out of 297) of surveyed students indicated that a choice of device increased effort, either agreeing or very much agreeing that, when facing something difficult, being able to choose on a device how to show their work makes them want to work harder on it. Choice using technology-based platforms extends to a student's feeling of academic success, with 72.1% (or 214 out of 297) of elementary students responding that even during difficult assignments, if they have choice, they feel successful. Participants reported growth in an identified 21st century skill as well, with 60.3% (or 179 out of 297) indicating that the act of having to choose the best platform to show their work has made them better problem solvers. However, students signified potential for development, with 77.1% (or 229 out of 297) of elementary participants indicating that the more opportunities given to them to evidence learning on their devices "their way," the more proficient they would become.

An additional seven questions concerned a student's perception of academic efficacy regarding the ability to use self-selected technology as a tool during assignment completion or to aid in the process of learning. Surveyed students perceived that having choices on a device

makes learning easier (60.3% or 179 out of 297), and allows them to better reach their goals

(73.1% or 217 out of 297). More precisely, 76.1% (or 226 out of 297) of students stated that,

during difficult assignments, individually choosing the platform to use for the assignment makes

the task easier. Ease of assignment completion is only one perceived benefit aiding a student's

perceived academic efficacy. As shown in Table 13, 68% (or 202 out of 297) of students stated

"I know I will grow in my learning" when given opportunities of choice in how to finish work on

given devices. Students continued to affirm scholarly confidence with supportive statements of

"I know I will be able to show my best work" (73.1% or 217 out of 297), as well as "I am able to

show that I am a good student" (75.8% or 225 out of 297) when referencing occasions when

teachers have allowed for student choice in evidencing learning using self-selected technology

on assigned tasks. This expressed academic efficacy extended to a student's self-confidence to

self-select a platform. An overwhelming 84.5% (or 250 out of 297) of upper elementary students

involved in the study felt confident in the ability to self-select the technology-based platform that

best evidenced their work.

Table 13

Survey Frequency Results: Research Question 4

Survey Question	Reported Frequency (Very Much Agree/Agree)	Very Much Agree	Agree	Neither Agree nor Disagree	Slightly Disagree	Very Much Disagree
Even if an assignment is hard for me, choosing the platform I want to use can make the assignment easier.	**76.1**	**35.7**	**40.4**	**14.5**	**6.4**	**3**
When I get a choice in how to finish my work on my device, I know I will grow in my learning.	68	24.9	43.1	20.5	8.4	3

Survey Item	Reported Frequency	VMA	A	D	VMD	Missing
When the teacher gives me choice in what platform to use to complete an assignment, I know I will be able to show my best work.	73.1	29.6	43.4	17.8	7.1	2
When something is hard, being able to choose on my device how to show my work makes me want to work harder on it.	60.9	25.3	35.7	27.6	7.7	3.7
No matter how hard an assignment is, if I have a choice in how to show my work, I feel successful.	72.1	30.6	41.4	18.9	6.7	2.4
On my device, the more opportunities I get to show my learning, my way, the better I get at it.	**77.1**	**38.7**	**38.4**	**15.2**	**4.7**	**3**
I am able to show that I am a good student when I get to choose how to show my learning on my device.	**75.8**	**33**	**42.8**	**16.2**	**5.1**	**3**
Learning can sometimes be hard, but having a choice on my device can make learning easier.	60.3	25.6	34.7	23.9	11.1	4.7
When my teacher lets me choose 'my way' to show what I know on my device, I know I will get closer to reaching my goals.	73.1	30.3	42.8	20.5	5.1	1.3
Having to choose the best platform to show my work has made me a better problem solver.	60.3	23.9	36.4	27.6	8.8	3.4
I feel confident in my ability to choose the best platform for my work.	**84.5**	**40.9**	**43.6**	**10.8**	**4.1**	**0.7**

Note: "Reported Frequency" is representative of students who marked "Very Much Agree" or "Agree" on the individual survey item. Bold font indicates significance of .75 or greater for the survey item used in principal component analysis.

Principal Components Analysis

A researcher conducts a Principal Component Analysis (PCA) in an effort to distinguish

and reduce data to correlated components that exist within the structure of a larger set of

variables (Field, 2013; Jolliffe, 2011; Lever et al., 2017; Wold et al., 1987). This statistical

examination further added to the quantitative results of the survey by inspecting the variance that

exists between each selected item, offering the researcher an empirical summary of the given

data set (Field, 2013; Jolliffe, 2011).

The PCA was conducted using sixteen significant items or variables from the Technology

Choice & Academic Efficacy Student Perception Survey. The survey item was deemed

significant if the reported frequency met the researcher established criterion of 75% or higher,

meaning .75 or more of participating survey students marked "Very Much Agree" or "Agree" on

the individual survey item. Table 14 captures the individual variables from across the survey

included in the PCA analysis. Again, knowing reliability and validity of data is foundational to

statistical examination, a Cronbach's alpha was used to determine internal consistency of the

new variable set (Henson, 2001; Mertler, 2016). The items generated alpha was .84 ($\alpha = 0.836$),

above the .70 ($\alpha > 0.70$) acceptable guideline (Field, 2013; Tavakol & Dennick, 2011).

Table 14

Survey Frequencies used in Principal Components Analysis

Survey Question	Reported Frequency (Very Much Agree/Agree)	Very Much Agree	Agree	Neither Agree nor Disagree	Slightly Disagree	Very Much Disagree
When I have an assignment, choosing how I will finish my work on my device makes my work more enjoyable.	85.2	36.7	48.5	11.1	3	0.7
It's exciting when I get to choose for myself how to complete my assignment on my device.	76.8	36	40.7	15.5	5.7	2
I like my school work best when I can choose to use my device to complete assignments.	75.1	38.4	36.7	14.1	8.4	2.4
On my device, I like to choose what platform to finish my assignment in.	78.8	38.4	40.4	15.2	5.1	1
I will choose a platform for my assignment because it allows me to be creative.	84.8	51.5	33.3	11.8	2.4	1
When completing my work on my device, I choose only the platforms that I know I am good at using.	81.1	47.1	34	11.8	5.1	2
When given the chance, I know I can choose the best platform on my device to show my best work.	85.9	41.1	44.8	9.1	5.1	0
Getting a choice to use my device on my school work allows me to better show what I know to my teacher.	77.8	31	46.8	15.8	4	2.4
When I get to choose, I think carefully about what platform will show my best work on my device.	83.8	40.4	43.4	11.1	4	1

I like to choose what platform to use, rather than someone else tell me what platform to use.	**79.1**	**51.9**	**27.3**	**13.1**	**4.7**	**3**
When we use our devices, I enjoy the assignment more when I have a choice in how to complete the work.	**79.5**	**35**	**44.4**	**13.5**	**4**	**3**
Being able to choose for myself how to complete my assignments on my device lets me show my very best work.	**75.3**	**29.1**	**46.3**	**17.2**	**5.7**	**1.7**
Even if an assignment is hard for me, choosing the platform I want to use can make the assignment easier.	**76.1**	**35.7**	**40.4**	**14.5**	**6.4**	**3**
On my device, the more opportunities I get to show my learning, my way, the better I get at it.	**77.1**	**38.7**	**38.4**	**15.2**	**4.7**	**3**
I am able to show that I am a good student when I get to choose how to show my learning on my device.	**75.8**	**33**	**42.8**	**16.2**	**5.1**	**3**
I feel confident in my ability to choose the best platform for my work.	**84.5**	**40.9**	**43.6**	**10.8**	**4.1**	**0.7**

Note: "Reported Frequency" is representative of students who marked "Very Much Agree" or "Agree" on the individual survey item. Bold font indicates significance of .75 or greater for the survey item used in principal component analysis.

Further tests ensuring reliability and validity were also affirmed before continuing the exploration of data using a PCA. The study's sample size of almost 300 ($n=297$) lent itself to a solid factor or principal components analysis (Field, 2013; Osborne & Costello, 2004). A Kaiser-Meyer-Olkin (KMO) was used to determine whether a factor analysis or PCA of specified variables would reveal reliable factors or components (Field, 2013; Hutcheson & Sofroniou, 1999). The submitted PCA variables noted a KMO score of .882, well above the indicated

minimal guidelines of .60 (Field, 2013; Hutcheson & Sofroniou, 1999). As a final measure,

Bartlett's Test of Sphericity was conducted and confirmed the existence of significance

correlations (p < 0.01) within the presented data or variables (see Appendix N) (Field, 2013).

The researcher used both eigenvalues and scree plot analysis for component extraction

(Cattell, 1966; Field, 2013; Stevens, 2002). Initial outputs indicated three components had

eigenvalue loadings above the Kaiser's criterion of 1.0, accounting for 44.67% of the common

variance among the variables (see Table 15).

Table 15

Principal Component Analysis: Eigenvalues, Percentages, & Total Variance

Component	Eigenvalue	% of Variance	Cumulative % of Variance
1	4.728	29.552	29.552
2	1.301	8.128	37.681
3	1.119	6.993	44.673
4	.987	6.169	50.842
5	.937	5.857	56.699
6	.896	5.599	62.298
7	.825	5.159	67.457
8	.730	4.561	72.019
9	.705	4.406	76.425
10	.646	4.037	80.462
11	.625	3.905	84.367
12	.561	3.508	87.875
13	.554	3.464	91.339
14	.481	3.009	94.348
15	.473	2.955	97.303
16	.432	2.697	100.000

Note: Extraction method used was Principal Component Analysis using Direct Oblimin Rotation.

Although three components were initially extracted, a combination of percentage of variance and scree plot analysis revealed that component one carries over three times the variance (29.55%) within the matrix than any other extracted component identified (see Figure 8). Due to the weight of the eigenvalue (4.728) and the significant related reported correlations, the researcher focused analysis and interpretation of the PCA to this singular extracted component. Supporting literature further backs this decision, recommending a researcher limits interpretation of components to those that explain 16% or more of a variable's variance, and reveals factor loadings of .4 or greater (Field, 2013; Stevens, 2002). Therefore, component one was retained and interpreted.

Figure 8

Scree Plot of Extracted PCA Components
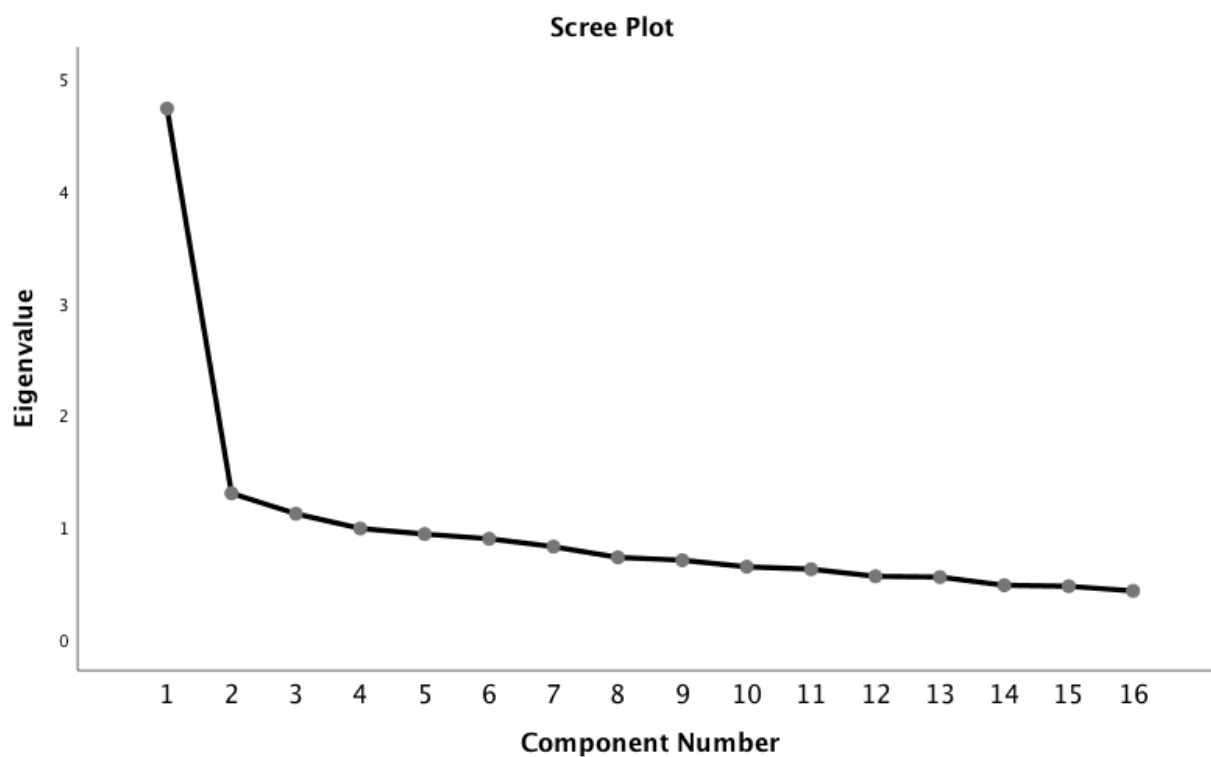
A Direct Oblimin rotation was used to produce loadings for extracted components. The retained component indicated significant factor loadings (greater than .40) ranging from .463 to .769 (Field, 2013; Stevens, 2002). Items within this factor centered around the effects of technology-based student choice during assignment completion on student's academic efficacy and engagement. Table 16 displays the extracted components and corresponding factor loadings.

Table 16

Principal Component Analysis: Pattern Matrix of Extracted Components

Survey Item	Component		
	1	2	3
RQ4.Q42	**.769**	-.174	.152
RQ3.Q41	**.691**	-.005	.071
RQ2.Q40	**.595**	.032	-.085
RQ4.Q32	**.500**	.068	.255
RQ1.Q35	**.488**	.312	.041
RQ2.Q31	**.485**	.114	.049
RQ2.Q26	**.463**	.094	-.219
RQ3.Q27	.021	**.688**	-.118
RQ3.Q15	.099	**.670**	-.219
RQ2.Q18	.062	**.670**	.109
RQ4.Q12	-.089	**.619**	.182
RQ2.Q22	-.044	**.558**	.235
RQ4.Q30	.275	**.428**	.028
RQ1.Q4	-.047	.079	**.734**
RQ2.Q14	.134	.114	**.594**
RQ2.Q37	.428	-.009	**.544**

Note: Survey item number is based on Qualtrics survey flow, refer to Appendix J for reference. Extraction Method: Principal Component Analysis-Rotation Method, Direct Oblimin. Bold font indicates significance of .40 or greater.

Qualitative Results

In explanatory sequential design, qualitative data is used to support or explain the quantitative results captured during phase one of the study (Creswell, 2009, 2015; Ivankova et al., 2006). During phase two, semi-structured, peer focused groups supplied the researcher with qualitative data for examination. The focus group recordings were transcribed (see Appendix L), and a deductive thematic analysis was conducted using concepts outlined in the "Three C's of Data Analysis," a process that aids construction of meaning by moving from codes to categories, and then categories to concepts (Lichtman, 2012). Table 17 displays the top 20 codes identified by the researcher during the deductive coding process.

This six-step process included initial coding, revising initial coding, developing an initial list based on additional rereading, revisiting categories and subcategories, and, finally, moving from categories to concepts (Lichtman, 2012). Identified codes were then collapsed into categories using similar ideas. An example of this consolidation included codes of faster, easier, efficient, and best work. All of the presented codes related to student's perceptions of assignment completion when given choice. These codes were consolidated into one category, labeled Choice & Assignment Completion (see Table 18).

Table 17

Frequent Codes from Semi-Structured Peer Focus Groups

Peer Focus Group Code	Frequency of Codes
Engagement/Learning Environment	103
Preference of Student Choice	87
Creativity	73
Confidence/Efficacy (Choice on Assessments)	66
Experience/Efficacy (Platform Choice)	62
Preference of Using Device	51
Easier (Assessment with Choice)	49
Features (Platform Choice)	34
Platform as Tool	32
Exposure to New Apps/Platforms (Importance of)	30
Show Best Work (Assignment with Choice)	26
Able to Focus on Content	24
Feelings of Engagement	22
Independent Learners	20
Practice = Growth	19
Project/Time (Platform Choice)	16
Choice Aids Learning	15
Risk-Taking/Try New Things	14
Choice & 1:1 Structure	14
Faster (Assignment with Choice)	10

Table 18

Constructed Categories from Semi-Structured Peer Focus Groups

Constructed Peer Focus Group Categories	Frequency of Codes
Ownership & Voice	211
Instructional Environment/Culture	125
Efficacy: Experience = Confidence	96
Choice & Assignment Completion	89
Creativity	73
Learning Process	71
Student Mindset	69

Repeated immersion in the data allowed for increased understanding by the researcher.

Knowledge from this analysis, merged with the conceptual and theoretical frameworks of the

study, was used to develop themes (Creswell, 2015; Marshall & Rossman, 2015). Conceptual

themes include Engagement, Efficacy, and Learning Process, all centered on a foundation of

Student Experience and Exposure (see Figure 9).

Figure 9

Conceptual Themes Developed from Semi-Structured Focus Groups

Engagement

The first identified theme deals with the perceived engagement among students when offered opportunities of choice and/or the ability to self-select technology when completing assignments. Similar statements such as, "I feel great when we have a choice because when we have a choice, you're free to do your work how you want to…" and "…if you had choice, kids might want to pay attention or go to school…" were repeated sentiments from student participants. Students' assertions regarding engagement were generalized under one of two sub-

themes, the impact of technology-based choice on student perceptions of the instructional environment/culture, as well as preferences of student choice that relate to ownership and voice in the classroom setting.

Efficacy

The study's second theme centers around elements of efficacy expressed by the majority of focus group participants when evidencing learning using a technology-based platform of their choice. The word "confidence" was often used by students to describe how they felt when charged with choice during their learning. A fourth grader remarked, "I think it makes them feel more confident. It makes them feel like they can use this app…figure out how to, like, change stuff and do their very best." The established site criterion of this study ensured that participating students had exposure to technology-based student choice opportunities in the classroom. Experience in this autonomous practice emerged as a central theme relating to a student's perceived efficacy. "[When given choice] it's easier to work and do your best work, and finish it at the deadline…when your using a[n] app you really don't know about, it's like way harder." As seen in Figure 10, experience was also identified by upper-elementary students as a main consideration when self-selecting a platform for an assignment, followed by the specific features a platform may offer, in addition to the time and requirements of a specific project.

Figure 10

Expressed Reasons of Platform Choice when Self-Selecting Technology
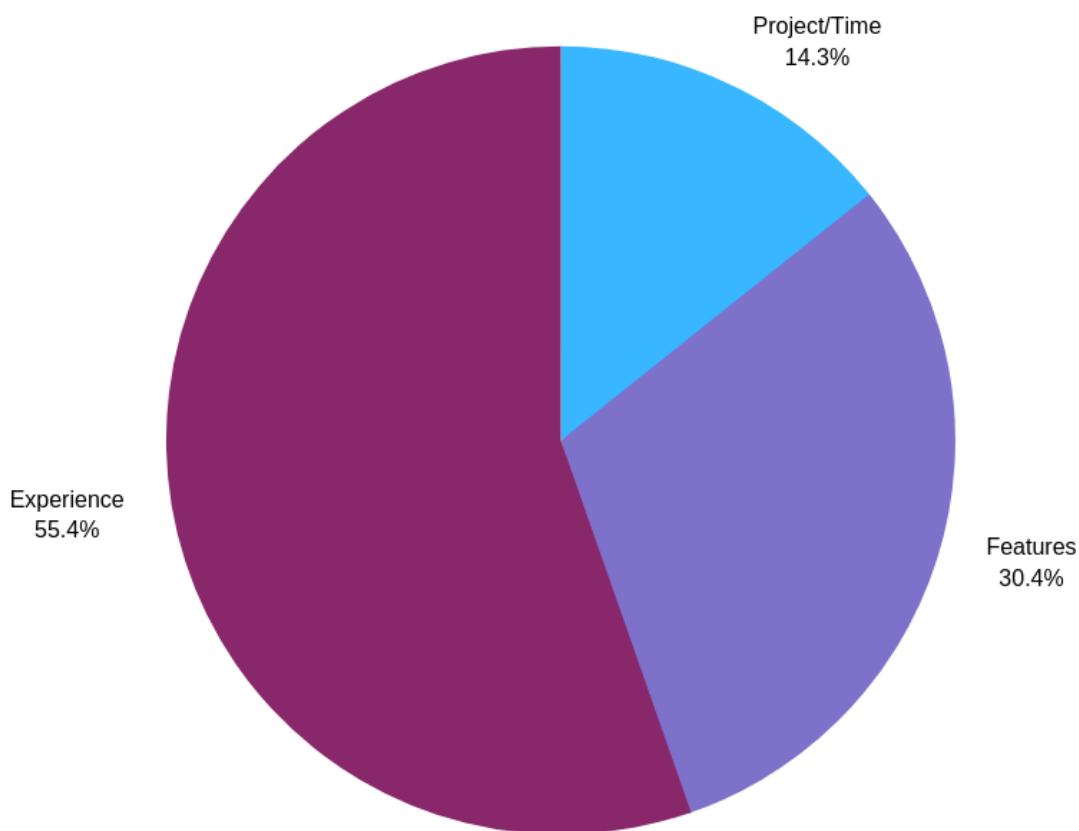
Note: Percentages account for frequency of coded occurrences.

      Two sub-themes were identified under efficacy: assignment completion and student mindset. Across the elementary study sites, students voiced opinions on self-selected technology choice in relation to their perceived ability to complete assessments. Of these coded descriptions, students indicated that student choice makes a given task "easier" to complete (see Figure 11). Focus group students also suggested that technology-based choice allows for them to do their "best work."

Figure 11

Perceived Benefits to Assignment Completion when Self-Selecting Technology
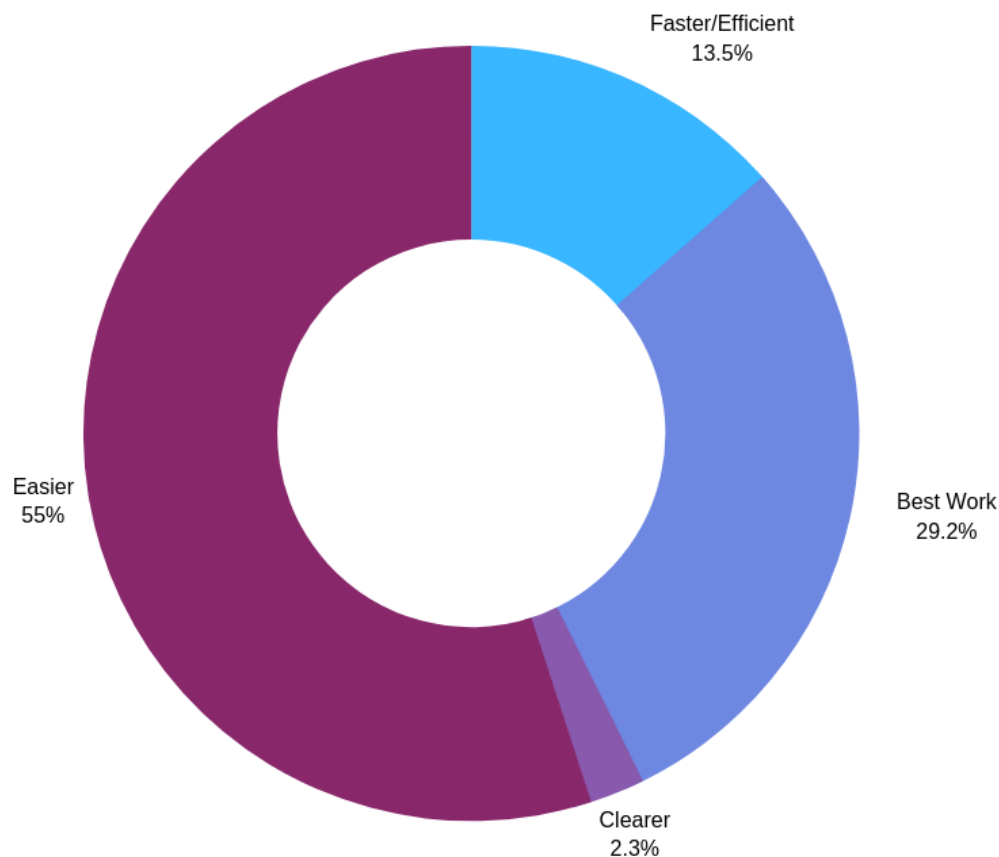
Note: Percentages account for frequency of coded occurrences.

Shared attributes of student mindset emerged as another sub-theme to efficacy. When asked, "Because you have had those opportunities to choose for yourself how do you show what you know on your devices…What has that made you learn about yourself as a learner? Responses included, "I learned…some things are not as hard as you think they are." As well as, "It helped me learn that I can do hard things." Throughout the focus group sessions, student mindset qualities were coded sixty-nine times as students described experiences of self-selecting technology to complete or evidence learning. While 29% of the codes centered on student independence, the awareness that growth takes practice, along with the willingness to take risks

also surfaced as prominent dispositions. Increased effort, self-reflection, and flexibility were also perceived characteristics either experienced or gained when sharing occurrences of autonomy in the classroom (see Figure 12).

Figure 12

Student Mindset Attributes Exhibited/Expressed by Students
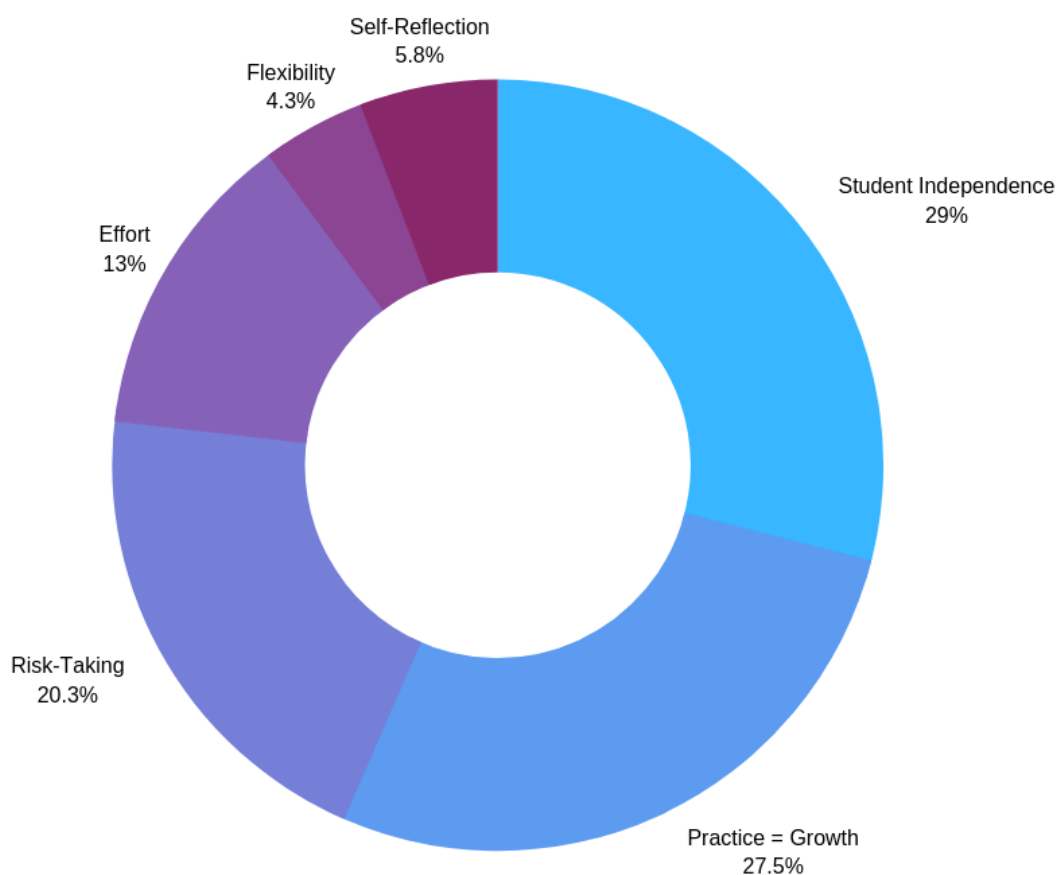
Note: Percentages account for frequency of coded occurrence*s.*

Learning Process

The Learning Process represents the third developed theme. Students indicated that the use of technology within the instructional environment aids their individual learning process.

- "It helps me,"

- "It helps me, like, learn more,"

- "…people want to use choice because it helps,"

- "I am able to do more and feel more confident," and

- "I could get my grades up…"

 However, this perception is again rooted in a student's experience and exposure. Several students shared that their device capacity, in combination with student choice, allowed them to learn more of the intended content:

> And sometimes when we use the platform that we're not comfortable with, we focus more on what we're supposed to be doing [on the platform]. Because I know when I work with a new platform, I'm, like, experimenting with it and I kind of run out of time to do, like my actual work.

Furthermore, many focus group participants viewed their device as a tool that aids success within the classroom setting. These comments among participants were personalized and specific from learner to learner, varying from correction of misspelled words, to adding creative graphics, communicating ideas, collaborating, researching and accessing resources, and individual organization.

Conclusion

Chapter IV offered information on data collection methods, participants, and both quantitative and qualitative findings surrounding perceptions of upper-elementary learners when self-selected technology-based platforms are used to complete assignments. Using an explanatory sequential design, this mixed methods study was conducted in two separate phases (Creswell, 2009, 2015; Ivankova et al., 2006). In phase one, quantitative survey data from 297 participants was initially explored using frequencies. A Principal Components Analysis was also

conducted to distinguish and reduce data, identifying if any correlated components existed within the larger set of presented variables. The PCA revealed one significant factor focused around engagement and efficacy (Field, 2013; Jolliffe, 2011; Lever et al., 2017; Wold et al., 1987). Driven by the quantitative findings, phase two of the study focused on the examination of qualitative data. Three themes emerged during analysis, engagement, efficacy, and learning process. Students in participating study sites, who had been offered opportunities of choice and/or the ability to self-select technology when completing assignments, expressed shared experiences of engagement. This engagement between the student and the process pushes past the presented assignment or task, allowing for expression and participation in the overall learning environment and culture. In addition, choice allows for individual student preferences and encourages ownership and voice in the classroom. The efficacy or confidence of students is noted when the autonomous practice of student choice is given. However, this perceived efficacy is embedded in a student's experience and exposure of student choice as well as device capacity, affecting platform choice and student mindset. Students viewed their device as tools/resources in the instructional setting. Again, increased experience on the device and exposure to technology-based platforms shaped this viewpoint, determining how students perceived both the device and the option of choice within the learning process.

Chapter V

Discussion

Introduction

Although the industrialized educational system has adequately supplied the majority of students with the needed skills of past societies, the current information age places distinctive demands on today's learners (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Mitchell et al., 2010; Nisha & Rajasekaran, 2018; Sharkey & O'Connor, 2013; Voogt et al., 2013). The current marketplace requires workers to successfully problem solve, communicate, collaborate, innovate, process, produce, and construct knowledge (Adams Becker et al., 2016; Grant et al., 2014; Hilton, 2015; Horn et al., 2015; Johnson, 2009; Nisha & Rajasekaran, 2018; Mitchell et al., 2010; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012). For many, developing such aptitudes in students means modifications in pedagogy and shifting from teacher-driven classrooms to the incorporation of instructional practices that include recognized 21st century skills (Aslan & Reigeluth, 2013; Ellis, 2012; Evans & Boucher, 2015; Faulkner & Latham, 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014). Few debate the need to develop 21st century skills in today's students (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Carver, 2016; Ellis, 2012; Hilton, 2015; Horn et al., 2015; Johnson, 2009; P21, 2016; Trilling & Fadel, 2012; Voogt et al., 2013). The contention arises in implementation and the practices perceived as most beneficial to student success (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013).

Studies reveal a connection between a student's level of academic engagement at the elementary level and a student's future academic engagement and achievement (Ladd & Dinella, 2009; Upadyaya & Salmela-Aro, 2013). Learners must be place in student-centered environments in order to develop skills such as self-directedness, ownership, judgement, and

time management (Hilton, 2015; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012).

Intentional integration of devices can add an additional layer to this environment, making a

deepened student agency possible. (Aslan & Reigeluth, 2013; Ellis, 2012; Gillard et al., 2015;

Pahomov, 2014; Vander Ark, 2018). Research is lacking concerning research-based pedagogical

practices that involve the incorporation of 21st century skills. Studies centered on elementary

student perceptions involving a learner's ability to engage in choice and autonomy in evidencing

learning during student-centered assessments using self-selected technology-based platforms are

even more scarce. Research indicates a positive relationship between autonomous practices and

student learning, engagement, motivation, and self-efficacy (Assor et al., 2002; Brooks &

Young, 2011; Buchanan et al., 2016; Clark, 2012; Crow, 2009; Deci & Ryan, 2008; Evans &

Boucher, 2015; Gillard et al., 2015, Núñez & León, 2015; Pahomov, 2014; Westberg & Leppien,

2018). Current studies surrounding this topic are set in secondary and/or college environments

and neglect to report on the effects and integration of 21st century skills happening at the

elementary school level.

    The questions examined throughout this study included:

1. How does self-selected technology choice impact students' perceptions of student-
   centered assessments?

2. What are students' perceptions of choice in evidencing their learning using
   technology-based platforms?

3. When using technology-based platforms, what are students' perceptions regarding
   teacher-driven assessments versus student-centered assessments?

4. Are student's perceptions of personal academic efficacy impacted by the ability to
   self-select a technology-based platform to complete a student-centered assessment?

Chapter V will provide interpretation of the study's results, including relationships to literature and the presented theoretical framework. In addition, the researcher will discuss recommendations for further research and what implications the study's findings have on educational professional practice.

Summary of Results

The purpose of this mixed methods study was to examine upper elementary student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms. The mixing of both quantitative and qualitative data offers a rich and comprehensive evaluation of the proposed inquiry (Creswell, 2009, 2015; Ivankova et al., 2006, Johnson & Onwuegbuzie, 2004). An explanatory sequential research design was used to determine an effective order of data collection, as well as decisions regarding data significance (Creswell, 2009, 2015; Ivankova et al., 2006). Explanatory sequential design can be characterized by a two-phase, "in sequence," data collection process. Phase one of the study was quantitative, followed by phase two which was qualitative (Creswell, 2009, 2015; Ivankova et al., 2006). This research design uses qualitative data to further illuminate and understand quantitative findings (Creswell, 2009, 2015; Ivankova et al., 2006). In phase one of this study, quantitative data was collected from 297 upper-elementary participants using the researcher developed Technology Choice & Academic Efficacy Student Perception Survey, assessing a student's perception of the following:

- self-selected technology choice during assessments
- choice and evidencing learning using technology-based platforms
- teacher-driven versus student-centered assessments

- whether personal academic efficacy is effected by the ability to self-select and use
  technology-based platforms during assessments

Following the survey, semi-structured peer focus groups were conducted, recorded, and

transcribed to further examine and understand analyzed quantitative data. Triangulation of all

data was intentional by the researcher to support validity of findings (Creswell, 2015; Marshall

& Rossman, 2015; Maxwell, 2012).

Quantitative analysis of survey data included the use of frequency and principal

components analysis through the use of IBM SPSS, Version 25. The use of frequencies allowed

for conclusions regarding a participant's perception to be established on the presented study's

topics (Field, 2013; Frey, 2015). While the lowest reported frequency noted throughout the

survey's findings was 57.9% (.579), sixteen of the thirty-three Likert-based items revealed a

reported frequency above 75% (.75), indicating strong majority agreement among upper-

elementary participants' perceptions and positions concerning student choice of technology and

evidencing learning. Using .75 as a significance level, the researcher selected those sixteen

established points of agreement to further examine the data structure by conducting a principal

components analysis (see Table 14). A principal components analysis identifies correlated

"components" or "factors" that exist within a set of larger variables by examining the amount of

variance between included items (Field, 2013; Jolliffe, 2011; Lever et al., 2017; Wold et al.,

1987). Using both eigenvalues and scree plot analysis, initial outputs extracted three component

loadings above the Kaiser's criterion of 1.0, accounting for 44.67% of the common variance

among the variables (see Table 15) (Cattell, 1966; Field, 2013; Stevens, 2002). Literature

supports limiting interpretation of components to those that explain 16% or more of a variable's

variance, and reveal .4 or greater factor loadings (Field, 2013; Stevens, 2002). For this reason,

one factor was retained and interpreted. A Direct Oblimin rotation produced significant loadings (greater than .40) for the retained component ranging from .463 to .769 (Field, 2013; Stevens, 2002). Items within this factor centered around the effects of technology-based student choice during assignments on student's academic efficacy and engagement.

Qualitative findings from phase two support and clarify these quantitative results. Using data supplied from five, site-based, semi-structured, peer focused groups, the researcher completed a deductive thematic analysis applying concepts outlined in the "Three C's of Data Analysis" (Lichtman, 2012). This process aids a researcher in the construction of qualitative meaning, by moving from initial codes to categories, and then from categories to concepts (Lichtman, 2012). Persistent immersion in the data allowed for an increase in both understanding and knowledge. Merged with the information from the study's conceptual and theoretical frameworks, major themes including Engagement, Efficacy, and Learning Process, all centered on a student's foundation of Experience and Exposure (see Figure 9), were developed (Creswell, 2015; Marshall & Rossman, 2015).

Research Question #1: Summary of Results and Discussion

The first question guiding this research was, "How does self-selected technology choice impact students' perceptions of student-centered assessments?" Combined data from the conducted study suggested students perceive assessments and/or the completion of assignments to be more engaging when given the opportunity to self-select the technology used to evidence their learning. Learners who experience increased autonomy within the learning environment also experience an increased level of student motivation and see benefits in academic outcomes (Buchanan et al., 2016; Crow, 2009; Flowerday & Schraw, 2000, 2003; Kim, 2015; Koh, 2016; Pahomov, 2014; Royer et al., 2017; Thompson & Beymer, 2015; Wang & Eccles, 2013;

Westberg & Leppien, 2018). Survey results indicated that students not only perceive assignments as more enjoyable when choosing how they will finish work on devices, but also view these opportunities as exciting (see Table 10). Similar viewpoints were echoed through the qualitative theme of Engagement as well as sub-theme, Instructional Environment/Culture.

Figure 13

Conceptual Theme: Engagement
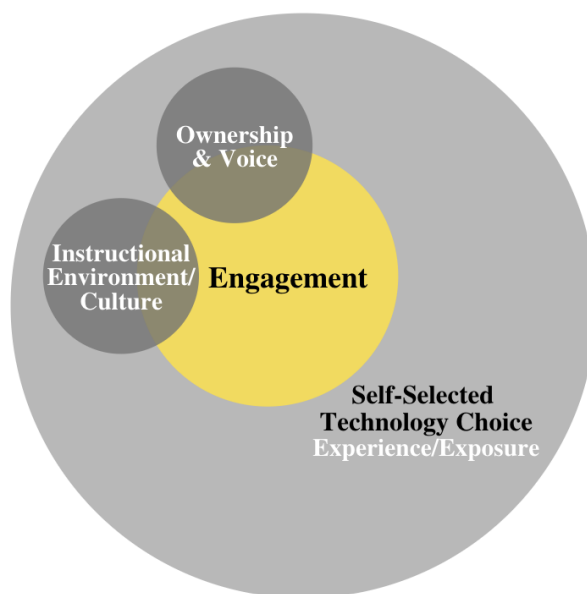
Many comments directly spoke to the practice of allowing for student choice of technology or self-selecting technology platforms to evidence learning. Often, these personal accounts extended past the more obvious engagement of assignment completion. How the student views the practices and culture of a classroom is essential (Assor et al., 2002; Brooks & Young, 2011; Kim, 2015; Núñez & León, 2015; Wang & Eccles, 2013). Multiple participants in all focus groups shared testimonials regarding this autonomous practice and how student choice impacted their perception of the overall instructional environment and learning culture. From "It's more exciting and fun!" to "I feel like if we get to choose that we can maybe focus more…," the

feelings expressed by students while reflecting on past experiences with self-selected technology choice are overwhelmingly positive. The following statements reiterate these students' perspectives:

- "...gives me more ability to have fun and do whatever I want on it. Like, except the same work, except fun,"

- "I feel good because I get to pick,"

- "I like having multiple choices…,"

- "I think that if we didn't do what we wanted to do, we wouldn't have the creativity that we wanted. And it would just be pretty much bland and boring,"

- "I think it's cool,"

- "It [choice] helps me because, like I said before, if you're bored, you don't really feel that good and you don't really learn that well too," and

- "…we have more freedom on our choice."

An educator must be viewed by students as a supporter of their autonomy (Brooks & Young, 2011; Kim, 2015; Núñez & León, 2015). Establishing and maintaining a learning environment of trust between educators and students is a cornerstone to academically impacting learners (Astuti, 2016; Houser, & Frymier, 2009; Kim, 2015; Pahomov, 2014; Wang & Eccles, 2013, Zhao, 2015). Beyond traditional engagement factors, students addressed additional aspects of classroom culture influenced by student choice of technology-based platforms to complete assignments. Students perceived the offering of student choice by teachers as an act of trust. One 4th grader indicated, "…when their teacher gives them multiple choices, they probably feel that their teacher trusts them to do their very best work on whichever platform they would like." A

fifth grader also voiced, "In a class with choice, I think it would be, I think they would trust you in making choice."

Impacting the emotions and motivation of a student, the role of the classroom environment cannot be understated (Assor et al. 2002; Ellis, 2004; Núñez & León, 2015; Saeki & Quirk, 2015; Wang & Eccles, 2013). By incorporating instructional practices that speak to the basic psychological needs of autonomy, competencies, and relatedness, educators benefit the overall well-being of students (Astuti, 2016; Núñez & León, 2015; Saeki & Quirk, 2015; Wang & Eccles, 2013). Many students depicted a classroom offering student choice in self-selected technology of assignments as a learning space with "less stress." "I feel pretty good about it [choice] because, like, just because, like, it helps me somehow, you know? Like, I don't have all this stress over me." Other students from other focus groups agreed stating, "If they [teachers] make all the choices, you have to learn all this stuff before you have to work it out, it feels like you're kind of getting punished for no reason…you'll feel stress. And it just feels hard." These acknowledgements among students give ample cause for educators to offer various forms of student choice and autonomous-based performance tasks within a student-centered instructional environment, avoiding a prescriptive or predetermined outcome (Herro & Quigley, 2016; Horn et al., 2015; Pahomov, 2014; Núñez & León, 2015; Thompson & Beymer, 2015).

The importance and impact of learning environments is evident within the theoretical framework of this study as well. The P21 Framework for Learning recognizes the role learning environments play in not only fostering, but sustaining, a 21st century learning environment (Trilling & Fadel, 2012). The framework acknowledges that "learning environments" are multi-faceted, extending far beyond the physical space of a building or classroom (Adams Becker et al., 2016; Couros, 2015; Hilton, 2015; Horn et al.; Trilling & Fadel, 2012). Because of this, the

P21 Framework places emphasis on the learning environment as one of its four supporting structures to adequately maintain and implement a 21st century learning model. P21 asks the instructional system to consider a holistic snapshot of the learning environment, including the school's daily operation, scheduling, courses and activities, the technology infrastructure of the school, the culture of the school's professional community and extended community, and also the school's educational leadership and policies (Trilling & Fadel, 2012). When addressing the overall learning environment, tackling areas that impact key social-emotional factors indentified by participants must be a priority. Educators need to adopt a '4c' mindset, focused on creativity and innovation, critical thinking and problem solving, as well as communication and collaboration (P21, 2015; Trilling & Fadel, 2012). Fostering these attributes shifts the traditional role of educators, placing teachers in the position of coaches or mentors. The directed focus on nurturing identified 21st century ideals within the classroom setting creates an instructional space that allows for relationship, as well as student questioning, expression of ideas, trust, risk-taking, and failure as normalized characteristics of the learning cycle.

Research Question #2: Summary of Results and Discussion

The importance of information literacy skills in today's society is emphasized among professional and academic disciplines alike. However, various entities struggle to agree on what specific informational literacy skills and attributes will best contribute to student success (Hilton, 2015; Sharkey & O'Connor, 2013; Voogt et al., 2013). For this reason, question two of this study asked, "What are students' perceptions of choice in evidencing their learning using technology-based platforms?" This question was answered using synthesized data from both quantitative and qualitative analysis. Survey results indicated a strong desire by students to use devices when completing school work (see Table 11). Two-thirds of surveyed upper-elementary students

would rather use devices during assignments than other mediums such as paper and pencil. Additionally, three-fourths of students indicated they like their school work best when the choice to use a device to complete an assignment was given. These findings were transferable to the focus group population as well, and were represented within the developed theme of Engagement and the subtheme of Ownership & Voice (see Figure 13). Most focus group students resonated with the survey majority with comments such as, "…when the iPads came in, it was like, it all turned around and I really like it." Another student added, "I like using the iPad because you can sort of put your own touch into it and add, like, show your personality and still do a good job with your work."

While the occurrences of coding "preference of device" to "preference to pencil and paper/no device" was 51 to 8, each site-based focus group had participants who spoke for the survey minority.

- "Because it's already bad enough that most kids use technology at their homes, and though it's good to have iPads, it helps [you] learn more, but it also may damage the way kids learn because so much is done on the iPad that it might ruin what they do with paper,"

- "I personally like paper better. Like because, I can write words down easier and then I don't have to, like, type it in. And it's just easier for me than it is [to] type,"

- "And the iPad's not the best because sometimes you will, it'll kind of turn off or die whereas your pencil, you can just keep sharpening it,"

- "So, I don't really like when we have the iPads because most of the time, they don't work,"

- "I feel more comfortable using paper than the iPad," and

- "It would make, like a difference because usually if we have a short amount of time, I would do my project on, like, paper so I'm able to take it home. But if we have a longer amount of time, I would probably do it on my iPad so I have time in class, in study hall. But if we were able to take it home, I would pick my iPad more often than paper."

Interestingly, when students declared preference for non-technology mediums, the reasoning behind the decision had very little to do with "liking or not liking" or the lack of envisioned benefits of the technology itself. Instead, outside influences that inhibit the effective use of the technology are cited as root causes for the student's decision, including technical/device issues, a student's lack of personal device capacity and/or skills, or limitations presented in the school's current 1:1 structure. In order to truly advance innovation in education, the system must account for a student's personal learning and competencies through the lenses of funding, policy, and learning space (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015; Trilling & Fadel, 2012). If not accounted for, a student's learning opportunities are ultimately restricted and autonomous instructional practices at the classroom level impeded, impacting the potential of learners.

Creativity is considered a valued attribute needed for success in the current and future marketplace (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Sharkey & O'Connor, 2013; Voogt et al., 2013).

So it makes it feel more creative if we can make, if we can show our, show 'our way' in a different kind of way. Not like, and how, like your parents or your teacher did it when they were in school, but we could make us feel different…like make us feel like we're unique in a different kind of way.

Perhaps one of the most prominent points of agreement in the survey centered around the topic

of creativity. Students showed a preference to platforms that allow for creativity. Another

element adding to the increased engagement a student perceives during opportunities of choice in

evidencing learning using technology-based platforms is the prospect to display personal

creativity. One student detailed, "It [choice with device] makes me feel like I can show off what

I learned and how I learned them in different kinds of ways." Another voiced, "Like, probably if

everybody wanted to a Popplet, I'd probably want to do something else because I don't want to

be, like, in the crowd." The technology-rich environment of today allows students and teachers

alike to revolutionize what innovation, inventiveness, and creativity looks like in the current

educational landscape (Adams Becker et al., 2016; Couros, 2015; Henriksen et al., 2016; Horn et

al., 2015; Ellis, 2012, Sharkey & O'Connor, 2013). Students recognize this as well, "…you can

show your artistic version while also showing what you know and how you would like to present

it." Although the survey only specifically addressed creativity for research question two, the

conversation surrounding creativity arose naturally in peer focus groups surrounding two

contexts under Engagement's subtheme of Ownership and Agency, centering around a student

preference to use devices and teacher-driven vs. student-centered assessments (see Research

Question #3: Summary of Results and Discussion). With the constant advancements of today's

society, creativity and innovation will remain a desired trait among 21st century workers (Adams

Becker et al., 2016; Hilton, 2015; Horn et al., 2015, iNACOL, 2015a; Johnson, 2009; P21, 2015;

Trilling & Fadel, 2012). Instead of rote memorization and recall of basic skills and facts, P21's

Framework for 21st Learning supports emphasis on fostering creativity and innovation. As with

any other identified skill, if nurtured, creativity and innovation can be learned, aiding in a

person's ability to think critically, collaborate with others, and implement ideas (P21, 2015;

Trilling & Fadel, 2012). For this reason, the P21 Framework places priority on learning

experiences that prolong and deepen student learning. Such activities should place importance on

the application of desired content by reasoning effectively (P21, 2015; Trilling & Fadel, 2012).

Lesson design should encourage students to draw conclusions and justify personal positions, all

abilities needed to effectively evaluate, analyze, synthesize, and communicate solutions (P21,

2015; Trilling & Fadel, 2012).

Students who receive opportunities of choice throughout a school day feel value and

relevance in the learning process (Ellis, 2012; Horn et al., 2015; Jacobson-Lundeberg, 2016;

Pahomov, 2014; Royer et al., 2017; Wang & Eccles, 2013). Even more indicative than

preference to using the device was the perceived value students placed on having the "choice" on

individual platform decisions during assessments. While most will choose a platform they are

confident with or experienced in, well over three-fourths of surveyed students noted that

platform choice is something they considered carefully, and they indicated the ability to choose a

platform in which they can demonstrate their best work. Although the P21 Framework for 21st

Century Learning stresses the importance of a student's ability to evaluate and access

information, to truly be media literate, a student must apply and manage the collected

information as well (Aslan & Reigeluth, 2013; Couros, 2015; Horn et al., 2015; Lemley et al.,

2014; P21, 2015; Trilling & Fadel, 2012; Sharkey & O'Connor, 2013).

In regard to assignment completion, the majority of surveyed students perceived that

using a device increased their ability to learn. Likewise, these students believed that choice on

their device better enabled them to show their knowledge to teachers. This could be attributed to

a developed sense of media literacy and the evolved student capacity to comprehend and use

media and technology tools to apply, create, and construct products that communicate their

individual ideas across various settings (Center for Media Literacy, 2015; P21, 2015; Trilling & Fadel, 2012). When speaking to student perceptions of choice in evidencing learning using technology-based platforms the theme of Efficacy appears, specificity within the subtheme of Assignment Completion.

Figure 14

Conceptual Theme: Efficacy
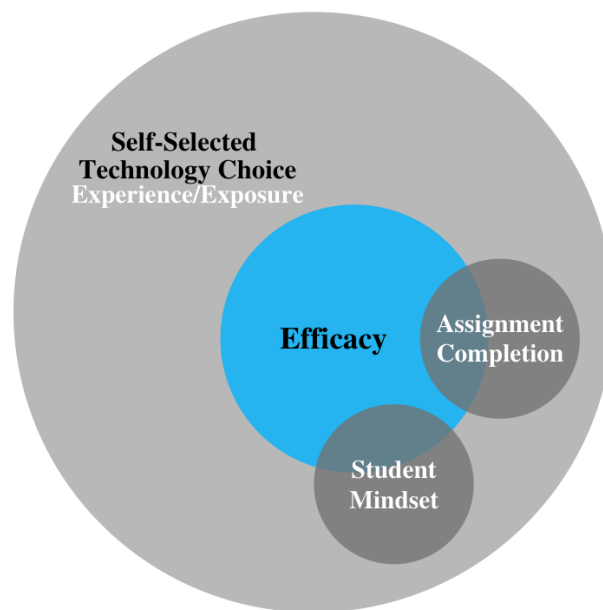
Whether it was that choice of technology made their assignments "easier," "faster," more "efficient," "clearer," or allowed them to do their "best work," comments giving examples such as, "I can show my best work because I can have an easier app that I know best and even make my work better" and non-examples, "It [not having technology choice] would just be harder and you probably wouldn't be able to get your work done as fast or at the deadline" were present throughout the focus groups (see Figure 10). A past experience of technology choice, along with device exposure shaped the student's perception of technology in the learning process.

The developed theme of Learning Process also aided in answering questions involving students' perception of choice in evidencing learning using technology-based platforms.

Figure 15

Conceptual Theme: Learning Process
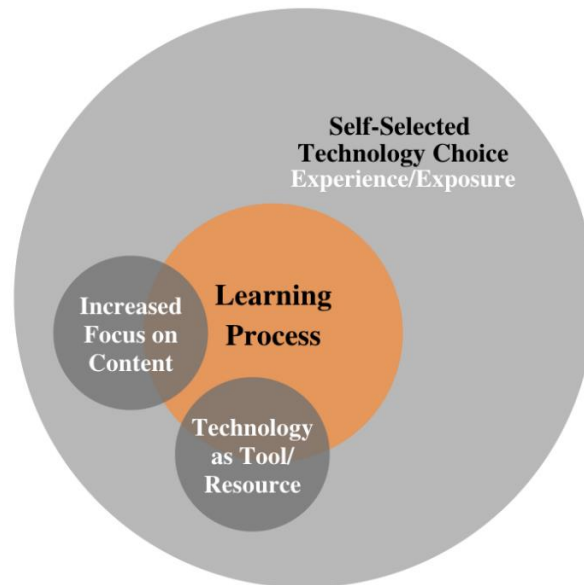
Technology transformation occurs when technology is used to allow for students' self-selection of learning goals along with independence in selected tools to achieve targeted outcomes (Aslan & Reigeluth, 2013; Horn et al., 2015; Lemley et al., 2014; Vander Ark, 2018). In addition to aiding assignment completion, students remark that assignments built around self-selected technology choice allowed for increased focus on intended content, commenting,

> Yeah, so when we get to choose, we…know, like, how to use it, so we're not really
> experimenting about it and so we're, like, digging in more…I know how to use Book
> Creator. So I was just learning more about my animal more than Book Creator.

Students even suggested that platform selection could influence what type of content you explore or learn.

It [technology choice] might change how you perceive the topic, so you might research it differently or learn it differently. So, it'd be different if you used one app. If I used iMovie, I might think about how it looks or something, maybe even sound…Like if you use Book Creator, you'd learn more about what it is or how it works. And if you're using iMovie, you might see something you didn't know was there, or something.

Additionally, technological tools and online content has redefined what is possible in the educational realm, with the power and resources to personalize and meet the individual needs of students (Couros, 2015; iNACOL, 2015a; Horn et al., 2015; Pahomov, 2014; Vander Ark, 2018). Learners experiencing choice in a 1:1 instructional environment repeated expressed views of technology as a learning tool or added resource of the classroom, citing the multiple ways it contributes to their learning cycle.

- "You can type and if you spell a word wrong, it will show you that you spelled a word wrong and you can save the word to the iPad,"

- "I love technology and that technology can really help you…it actually unscrambles the word for you. It uppercases the letters for you and it also doesn't have its handwriting sloppy,"

- "We can use the Siri thing that you can tell what you want to write down, except without even typing it down,"

- "I'll be able to go on one of the websites there that will be really helpful. Like, I can go on Google and it can help me better. And if I don't understand, I can go look at one of the pictures to show me and so then I can understand more…," and

- "If we are researching something, I learn more about it than if I just like, have to research in a book because I can find more."

The experience with multiple platforms and student choice in assessments helps to solidify recognized skills identified in P21's Framework's and 21st century literacies, including the ability to efficiently communicate content and ideas using technology-based tools and software (Adams Becker et al., 2016; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014; P21, 2016; Sharkey & O'Connor, 2013; Trilling & Fadel, 2012; Voogt et al., 2013).

Research Question #3: Summary of Results and Discussion

"When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?" was the third presented question of this study. Both quantitative and qualitative data revealed that upper-elementary students display a profound preference for student choice vs. teacher-driven assessments when using technology-based platforms to complete assignments. Literature acknowledges that student-centered instruction empowers learners by introducing student agency and ownership into the learning process (Aslan & Reigeluth, 2013; Buchanan et al., 2016; Gillard et al., 2015; Horn et al., 2015; Pahomov, 2014; Saeki & Quirk, 2015; Wagner, 2012). This study demonstrated that this type of empowerment and agency is transferable to student-centered learning environments that include technology-based choice of student-centered assessments. Rather than teachers prescribing what can be used during assignment completion, participants surveyed denote a strong desire to be in control of their device mediums. Again, survey and focus group findings showed that engagement is a contributing factor to these results. Conclusions suggest that when students are offered choice in completing assignments with devices, learners "enjoy" the assignment more, indicating this choice keeps the work "from being boring" (see Table 12).

The P21 Framework for learning includes productivity, accountability, initiative, and self-direction as necessary life and career skills (P21, 2015; Trilling & Fadel, 2012). The need to make choices is authentic to everyday life; mentoring and providing students with opportunities to make decisions is not just a positive practice, but can produce a real-world life skill needed to thrive in today's society (Couros, 2015; Horn et al., 2015; Pahomov, 2014). While mentioned, the preference for technology-based teacher-directed assignments was only coded three times throughout the five site-based focus groups. Students expressed a need for student agency within the educational setting, leading to the established subthemes of Engagement, Ownership and Voice (See Figure 13). One fourth grade student stated, "It [the ability to choose] makes me feel like I can show my best work because I can have an easier app that I know best and even make my work better." Educators must introduce a variety of assessments within instruction, taking less prescriptive and more open-ended approaches that increase student production and construction of content (Adams Becker et al., 2016; Henriksen et al., 2016; Herro & Quigley, 2016; Horn et al., 2015; Pahomov, 2014; Spruce & Bol, 2014). Students expressed the preference to be placed in the driver's seat of assignment completion, taking on the ownership of evidencing learning through devices. Surveyed upper-elementary students perceived that device-based, student-centered assessments, rather than device-based, teacher-driven assessments, allowed them to learn more, enabling them to evidence their best work (see Table 12). The Principal Components Analysis offered additional insights to this student perspective. When analyzing survey variables regarding technology-based student choice during assignment completion, the PCA noted significant correlations between items that address aspects of student's engagement and feelings of academic efficacy, more specifically a student's perception

in their ability to make individual technology-based choices that lead to successfully evidencing learning. Focus group members communicated this message as well:

- "I like multiple [choices] because I get to choose, like, which one I'm more comfortable with. Because the teacher can pick one that I don't really know so my project maybe doesn't turn out as well as the ones that I do know how to do it with,"

- "So when the teacher, she picks what apps we have to use, it sort of makes me feel, less free…But when I get to pick the apps I can use, it makes me feel more easier. It makes me feel like I have control of myself more,"

- "It makes me feel more confident because I can, like do it how I want to do it better than if I just, like, if the teacher tells me to do it exactly this way. It's [no choice] more hard because you don't, it's like you're not comfortable, you don't know what you're going to do,"

- "Probably because when you get to choose what platform you use, you'll feel comfortable with your choice because you get to choose it. It's not your teacher choosing your platform for you, you get to choose different presentation apps or just apps to do it in," and

- "I feel like when the teacher's making all the choices, they're trying to make sure that if, like, you grow up and be a teacher that you would probably be mean to your students too. But when you're a student and you get choice, it's a lot funner because you can get work done faster and it will be a lot more efficient than them telling you what to do."

Mastery-based or criterion referenced assessments play a vital role in initiating and fostering self-directed students who take on active roles in the learning environment (Alkharusi et al., 2014; Aslan & Reigeluth, 2013; Herro & Quigley, 2016; Horn et al., 2015; Vaughan, 2014). P21

establishes that in order for students to be prepared for the current workplace, learners must be in educational landscapes that offer experiences in managing personal goals and time, working independently, and opportunities for self-direction (Assor et al., 2002; Brooks & Young, 2011; Crow, 2009; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012).

Research Question #4: Summary of Results and Discussion

The last research question asked dealt with student efficacy, asking, "Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?" Collective data indicated that upper-elementary student perceptions of personal academic efficacy were positively impacted by opportunities to self-select technology during assignment completion when a foundation of experience and exposure to platform choice and device capacity was established. One student recognized, "When you learn new apps, you learn that you, when you participate in something, like, maybe a project that your class is working on, then you learn more about yourself and more about what you're capable of." Another student reiterated, "When I'm in a classroom, like without a choice, then sometimes I might not feel confident in my work and what I'm doing." While a super-majority of surveyed students indicated that "I know I will grow in my learning" when offered technology-based choice in assignment completion, around three-fourths of upper-elementary students stated that technology-based choice enabled them to show their best work and demonstrate they were good students (see Table 13). The intentional use of autonomous practices and intrinsic motivational approaches in course design nurtures individual growth of students (Brooks & Young, 2011; Buchanan et al., 2016; Crow, 2009; Gillard et al., 2015; Kim, 2015; Pahomov, 2014; Royer et al., 2017). A focus group participant added, "What I've learned about myself is that I can. I feel that I can do my work better if I have a choice."

Another substantial moment of agreement within the survey revealed the perceived feeling of confidence among students to choose a platform that shows their "best work" (see Table 13). The conducted PCA also supports this conclusion, identifying correlations between survey variables that speak directly to elements of student engagement and feelings of academic efficacy, particularly perceptions surrounding the capacity to make individual technology-based choices that lead to successful evidencing of learning (see Table 16). Qualitative findings also supported this result, with one fifth-grade student affirming,

I feel that I can work better because there's something that I know better, if there's like, one thing that I don't really know about and then there's something else that I know really good, then I can have a chance to do what I am good at instead of not doing it very well.

In order to cultivate 21st century aptitudes and tendencies in students, teachers must purposefully model such proficiencies by engaging in innovative pedagogical practices within the classroom (Couros, 2015; Faulkner & Latham, 2016; Henriksen et al., 2016; Göksün & Kurt, 2017). The practice of allowing for individual technology-based choices showed impacts beyond the learner's perceived efficacy in assignment completion, additionally influencing a student's mindset. Survey participants revealed that individual device choice during assignments can encourage personal effort and feelings of academic success, even when facing a difficult task (see Table 13). Sixty percent of upper-elementary students also suggest that making choices regarding technology-based platforms and how to display their best work has made them better problem solvers. Self-awareness of identified 21st century mindset attributes were evident throughout the peer focus groups as well, leading to the developed subtheme under Efficacy, Student Mindsets (see Figure 14). Student independence, a growth mindset, the willingness to

take risks, increased effort, as well as student flexibility and self-reflection are all vocalized dispositions students experienced or gained within a student-centered environment where autonomous structures and technology were used. Incorporating decision-making opportunities into the instructional setting was proven to be a worthwhile practice, one that develops mindsets of competence and autonomy among learners (Assor et al., 2002; Brooks & Young, 2011; Crow, 2009; Saeki & Quirk, 2015; Thompson & Beymer, 2015; Wang & Eccles, 2013). This established mindset was evident among the focus group members:

- "I've learned that I can, *I should* actually participate and personalize learning instead of just saying 'no', I don't want to do that. Instead, thinking flexibly and trying new things,"

- "…we can help each other understand what the assignment is and what the teacher wants us to do,"

- "Well, it's [choice with device] helped me to feel, to pretty much know that I don't really need the teacher always choosing the assignments…I've developed and learned that I kind of want to do the choices in what app I use,"

- "…the more activities that I do, the more that I learn,"

- "…sometimes I like to experiment with ones [platforms/apps]…like, if we have a longer time to work on it, sometimes I choose one that I'm not really comfortable with so that I have all the time to be, like, experimenting with and seeing, like, how the app works,"

- "If you never go out of your comfort zone, you'll never get better with other apps and so you'll never get good with other apps and then you won't, you'll, like always do the same one. And so your mindset on the app wouldn't ever grow," and

- "Anything is possible."

Although 'Efficacy' appeared as a reoccurring theme of the study's results (see Figure 9, and Tables 13 and 16, Chapter IV), it is important to note that student perceptions of efficacy, or expressed confidence, were highly tied to a student's perceived experience and exposure to student choice opportunities and device capacity. For school systems to effectively combat the prevalent educational practices of the industrialized society, technology integration must be purposeful, addressing both teaching and learning strategies (Couros, 2015; Horn et al., 2015; Lemley et al., 2014; Sharkey & O'Connor, 2013). This instruction goes beyond the introduction of a device-based platform. Educators should model how specific knowledge can be evidenced using an individual platform, as well as provide student perceived 'low-risk' opportunities for learners to gain familiarity with the platform across content areas. It is through exposure to technology-based platforms and student-choice opportunities that students gain the needed experiences to impact academic self-efficacy. Limiting student exposure and experience with device-based platforms and choice during assignment completion places perceived self-imposed boundaries on students and inhibits the autonomous practice. Students spoke openly regarding the underlying restrictions that lack of experience can take on a learner's use of platforms in the classroom setting, "…if it's a little assignment, then you could try a different thing. And if it's, like, a big assignment, then you could try that [platform] if it's easier for you." A student in a different focus group repeated this sentiment, "I like having choice because sometimes if we're doing, like, a small project, I can maybe…challenge myself. And if we're doing a really big project, I could just do the easiest one for me."

Fifty-five percent of codes pertaining to a student's selection of a technology-based platform to complete assignments centered around a learner's experience (see Figure 10), such as "you can choose one [app] where…you're more experienced with, so you can do better than

what you would do with a different app." Another student added, "So, it makes me feel pretty good because I get to choose, like, if I want to be out of my comfort zone or in my comfort zone." Three-fourths of surveyed students identified this embedded connection, indicating that more opportunities in evidencing learning "their way" while using devices will lead to increased proficiency (see Table 13). Learners accept that maturity in student choice and the use of technology is a process, with one student stating, "And then when we got our iPads, it was confusing to our class at first. And then, then we got used to them and it felt, the students really liked it and thought they could learn better that way." Furthermore, students specifically addressed the importance of educators introducing new platforms into the learning environment.

> I was thinking if our teachers don't give us new apps to use, then we wouldn't necessarily have a growth mindset on those. And we wouldn't really get the apps and how they work and we would just keep on using the same app over and over and over.

Participants recognized that experience and exposure of platforms aids in the overall efficiency of using them, saying, "We can use new platforms that the teacher gave to use and we can learn more about those platforms. And they might be more helpful than a different platform." Today's learners need aptitudes in media analysis along with the required proficiencies to create using device-based mediums (Bishop & Counihan, 2018; Horn et al., 2015; P21, 2015; Trilling & Fadel, 2012). The P21 Framework for 21st Century Learning speaks to this balance by establishing a multipart approach to instruction, merging content instruction with the 4C's of Learning and Innovation Skills (Critical thinking, Communication, Collaboration, and Creativity), Information Media and Technology Skills, and identified Life and Career Skills (see Figure 4) (P21, 2015; Trilling & Fadel, 2012). P21 acknowledges that attaining this 21st century instructional atmosphere requires shared vision and coordination among the model's identified

support systems (Standards and Assessments, Curriculum and Instruction, Professional Development, and Learning Environments), focused around an organization's official policy, distributed and coordinated leadership, learning of technology, and an emphasis on teacher learning (P21, 2015; Trilling & Fadel, 2012).

Conclusions

Current society calls for the development of 21st century attributes, skillsets, and mindsets in today's learners (Aslan & Reigeluth, 2013; Henriksen et al., 2016; Horn et al., 2015; Johnson, 2009; Sharkey & O'Connor, 2013; Voogt et al., 2013). For a society embedded in an overwhelmingly industrialized educational structure, development of 21st century skills in students will demand pedagogical shifts and changes in instructional practices (Aslan & Reigeluth, 2013; Ellis, 2012; Evans & Boucher, 2015; Faulkner & Latham, 2016; Hilton, 2015; Horn et al., 2015; Pahomov, 2014). Findings support that the combination of autonomous structures and purposeful device use, such as self-selected technology choice during assignment completion, can be used to promote a 21st century learning environment. Results indicate that practices including self-selected technology choice during assignment completion should be used to positively influence a student's perception of a task, shaping learner engagement, efficacy, and ownership in the learning process.

As research underscores, the manner in which a student interprets the practices and culture of an instructional setting is critical (Assor et al., 2002; Brooks & Young, 2011; Kim, 2015; Núñez & León, 2015; Wang & Eccles, 2013). Outside the feelings of conventional increased engagement, the use of student device-based choice during assignment completion led to notable participant perspectives regarding the overall classroom culture. Directly addressing

the use of this practice, upper-elementary students spoke of learning environments filled with educator trust and reduced student stress.

Combined data from this study indicated a strong student desire to use devices over other mediums, such as pencil and paper, when completing assessments in the classroom. Most participants believe technology-based platforms allow for them to evidence their best work while taking ownership in the learning process. Much of this expressed ownership comes in the form of student creativity. Creativity and innovation are desired traits in today's 21st century society (Adams Becker et al., 2016; Hilton, 2015; Horn et al., 2015, iNACOL, 2015a; Johnson, 2009; P21, 2015; Trilling & Fadel, 2012). Students view the opportunity to use a device and technology-based platforms as chances to exhibit individual creativity. Expressed ownership also comes through platform choice. Study findings indicate that when given choice, students carefully consider what platform they choose to complete assignments. Although experience with a platform is a primary consideration, students choose platforms that are most favorable in helping them produce their best work and expressing knowledge to their teachers. Most students state that technology-based choice aids in assignment completion. Though minimal participants voiced a "non-device" preference, reasoning for a "pencil and paper" mindset centered on causes that inhibited the student's effective use of the technology, including technical/device issues, a student's lack of personal device capacity and/or skills, or limitations presented in the school's current 1:1 structure.

Another element of ownership and voice captured within this study surrounds the strong preference students voiced to be "decision-makers" during assessments that include technology-based components. When weighing teacher-driven vs. student-centered device-based assessments, students concluded that student-centered tasks not only allow for deeper learning

and evidencing of "best work," but also increased feelings of student engagement and efficacy. Literature contends that using autonomy within student-centered assessments optimistically impacts a learner's performance, engagement, self-efficacy, and motivation (Aslan & Reigeluth, 2013; Clark, 2012; Ellis, 2012; Gillard et al., 2015; Núñez & León, 2015; Thompson & Beymer, 2015). This study affirmed this message, while also supporting the growth of 21st century competencies and literacies. The conducted PCA highlighted correlations between student engagement and feelings of academic efficacy. The identified factor directly addressed a student perceptions surrounding the capacity to make individual technology-based choices that lead to successful evidencing of learning.

Self-regulated learners develop positive self-efficacy, prompting effective academic and study routines (Alkharusi et al., 2014; Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Jacobson-Lundeberg, 2016). This study finds that offering self-selection of technology during assignment completion positively impacted upper-elementary students' academic efficacy when presented in an environment where students have experience and exposure to choice-making opportunities and device/platform capacity. A student's personal view of academic efficacy is directly impacted by how experienced a student feels with a specific platform or device. When technology-based choice is provided, students expressed academic efficacy in two major areas: the potential for growth in individual learning and perceived confidence in evidencing their best work. Educators can be purposeful in supporting these two identified areas of student academic efficacy through instructional practice. Teachers need to model how knowledge can be evidenced using various technology platforms while providing students with perceived 'low-risk' exposures to the platform across content areas. Additionally, this study found that incorporating the use of autonomous structures and technology allowed learners to

gain or experience attributes that resonate with identified 21st mindsets attributes, such as student independence, growth mindset, risk-taking, increased effort, flexibility, and self-reflection.

Recommendations for Further Research

The findings from this study addressed an existing gap in research with evidence that further supports a positive dynamic between student choice and a student's level of learning, engagement, motivation, and self-efficacy (Brooks & Young, 2011; Buchanan et al., 2016; Clark, 2012; Deci & Ryan, 2008; Evans & Boucher, 2015; Gillard et al., 2015). This mixed methods study was designed to examine upper elementary student perceptions surrounding choice and autonomy in evidencing learning during student-driven assessments using self-selected technology-based platforms. The information age, present-day culture, is calling for more student-centered approaches to instructional and assessment practices (Aslan & Reigeluth, 2013; Couros, 2015; Ellis, 2012; Henriksen et al., 2016; Hilton, 2015; Horn et al., 2015; Koh et al., 2012; Pahomov, 2014; Sharkey & O'Connor, 2013; Voogt et al., 2013; Wagner, 2012). Further research will prove critical to identifying best practices that lead to the development of 21st century skills and dispositions in today's learners.

As the group most affected by policy and instructional initiatives, educational research is calling for representation of student perspectives (Marshall & Rossman, 2015). While findings from the current study give voice to upper-elementary student perspectives, additional research involving student device-based choice and learner-centered assessments should be conducted with multiple age ranges and special populations. This study took place within the upper-elementary general education classroom. Although some special populations were included within the sample group, participants were limited to students who partake in general classroom instruction. Furthermore, answers within the study were not disaggregated by students identified

with special needs. A collection of studies, spanning a variety of grade levels and cross-sections of identified populations, could help in making the results of the current study more conclusive and generalizable.

One perception absent from this study is the opinion of the classroom educator. P21 places a distinct importance on teacher learning as an essential part of any effective 21st century initiative (P21, 2015; Trilling & Fadel, 2012). Across the presented 21st century learning models, significant changes involving the role of the teacher occur. Educators are asked to take on the responsibility of instructional designer, placing them in the position of facilitator, project leader, and mentor (Adams Becker et al., 2016; Gillard et al., 2015; Horn et al., 2015). A mixed methods or qualitative study examining teacher perspectives of this shift may influence the effectiveness of professional development or pre-service teacher training programs.

An identified limitation of the current study centered on the geographic isolation of research participants. Though the researcher took care in locating three sites with differing school dynamics, participating schools were regionally landlocked with multiple classrooms operating within the same district initiative. The body of research regarding the development of 21st century learning practices would benefit from studies that examine more diverse populations and initiatives, not only looking at elements of the district's 1:1 learning structure, but also the location (suburban, urban, rural, etc.), ethnicity, gender, and socioeconomic status of students the district supports.

Implications for Professional Practice

This research has identified multiple implications for professional practice to assist in developing effective learning environments conducive to 21st century learning. These implications include intentional focus of innovative instruction for both in-service and pre-

service educators, creating and supporting 21st century instructional environments, and ensuring

exposure to technology-based choice and device capacity of all students.

Knowledge of 21st century competencies by educators is important, but is lost if

educators cannot transform knowledge into instructional practices that deepen student learning

(Faulkner & Latham, 2016; Henriksen et al., 2016; Hilton, 2015; Koh et al., 2012; Sadaf et al.,

2016; Sharkey & O'Connor, 2013). In order for technology to truly be transformational, literature

states that educators must be accustomed to the learning device and have an awareness of

offerings the device brings to the learning experience (Couros, 2015; Kim et al., 2013; Pahomov,

2014; Trilling & Fadel, 2012). Therefore, training of in-service and pre-service teachers alike

should strive to equip educators with the capacity to model and foster 21st century innovative

ideals, aptitudes, and dispositions (Couros, 2015; Faulkner & Latham, 2016; Henriksen et al.,

2016; Göksün & Kurt, 2017). It is essential that pre-service education programs display and

cultivate instructional methods that encourage creative mindsets and enhance pedagogy within

technology-rich environments (Henriksen et al., 2016; iNACOL, 2014; Göksün & Kurt, 2017).

Suggestions include the adoption of a specific innovative framework or model, multiple course

offerings centered on innovation and educational technology, and systemic accountability

checkpoints to verify candidate dispositions throughout program.

Each year funds are used to support building infrastructures entrenched in traditional

industrialized philosophies, discounting the influence a flexible and collaborative instructional

space has on student learning (Adams Becker et al., 2016; Gordy et al., 2018; Horn et al., 2015;

Sharkey & O'Connor, 2013). Educational learning spaces must start with student-centered

instruction in mind (Adams Becker et al., 2016; Aslan & Reigeluth, 2013; Freeman et al., 2017;

Horn et al., 2015; Sharkey & O'Connor, 2013). The long term trends of districts must center

around creating and redesigning 21st century learning spaces. This revamp extends beyond the "brick and mortar" of a school building or classroom to encompass policies and procedures of how a school will operate, as well as strategic plans to implement deeper learning instructional approaches (Adams Becker et al., 2016; Freeman et al., 2017). This study demonstrates how the underlying constructs of a 1:1 environment can inadvertently inhibit student-centered practices. Every effort should be made to ensure that policies and procedures impacting learning environments are "student-focused" not "district or school-focused."

If educators ask students to use technology without established student device capacity, a teacher has simply redefined the learning environment, thereby creating a foreign instructional setting (Friedman & Heafner, 2007). Students need to be grounded in technology, able to use devices as tools for learning and processing of new information (Couros, 2015; Horn et al., 2015; Sharkey & O'Connor, 2013; Vander Ark, 2018). This study demonstrates that increased platform or device experience equals greater perceived feelings of academic efficacy in upper elementary students when given technology-based choice in evidencing learning. This finding leads to another implication for professional practice. Educators must continue to create "pockets of efficacy" by intentionally and consistently providing exposure to various platforms, modeling how the device-based medium can be used to effectively evidence learning. Students need to be offered opportunities to use the new or introduced platforms in perceived "low-risk" scenarios, allowing learners to accumulate the experiences needed to gain feelings of efficacy.

References

Abel, N. (2016, February 16). *What is personalized learning?* Retrieved from

http://www.inacol.org/news/what-is-personalized-learning/

Adams Becker, S., Freeman, A., Giesinger Hall, C., Cummins, M., & Yuhnke, B. (2016).

NMC/CoSN horizon report: 2016 K-12 edition. Retrieved from

https://www.nmc.org/publication/nmc-cosn-horizon-report-2016-k-12-edition/

Alkharusi, H., Aldhafri, S., Alnabhani, H., & Alkalbani, M. (2014). Classroom assessment:

Teacher practices, student perceptions, and academic self-efficacy beliefs. *Social

Behavior and Personality*, *42*(5), 835-855.

Aslan, S., & Reigeluth, C. (2013). Educational technologists: Leading change for a new

paradigm of education. *TechTrends: Linking Research & Practice to Improve

Learning*, *57*(5), 18-24. doi:10.1007/s11528-013-0687-4

Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy-

enhancing and suppressing teacher behaviours predicting students' engagement in

schoolwork. *British Journal of Educational Psychology, 72*(2), 261-278.

Astuti, S. P. (2016). Exploring motivational strategies of successful teachers. *TEFLIN Journal,

27*(1), 1–22. doi:10.15639/teflinjournal.v27i1/1-22

Basford, T., & Schaninger, B. (2016, April). The four building blocks of change. *McKinsey

Quarterly, 2016*. Retrieved from http://www.mckinsey.com/business-

functions/organization/our-insights/the-four-building-blocks--of-change

Bebell, D. (2005). Technology promoting student excellence: An investigation of the first year of

1:1 computing in New Hampshire middle schools. *Technology and Assessment Study

Collaborative,* 1-37. Retrieved from

https://www.researchgate.net/publication/28798429_Technology_Promoting_Student_Ex

cellence_An_Investigation_of_the_First_Year_of_11_Computing_in_New_Hampshire_

Middle_Schools

Bishop, R., & Counihan, E. (2018). Beyond the page: New literacies in the twenty-first

century. *Voices from the Middle, 25*(4), 39-44.

Bolarinwa, O. A. (2015). Principles and methods of validity and reliability testing of

questionnaires used in social and health science researches. *Nigerian Postgraduate

Medical Journal, 22*(4), 195-201.

Boogren, T., & Marzano, R. J. (2015). *Supporting beginning teachers*. Moorabbin, Victoria:

Hawker Brownlow Education.

Bradley, B. A. (2016). Integrating the curriculum to engage and challenge children. *YC Young

Children, 71*(3), 8-16.

Brooks, C. F., & Young, S. L. (2011). Are choice-making opportunities needed in the classroom?

Using self-determination theory to consider student motivation and learner

empowerment. *International Journal of Teaching and Learning in Higher Education*, *23*(1),

48-59.

Buchanan, S., Harlan, M. A., Bruce, C., & Edwards, S. (2016). Inquiry based learning models,

information literacy, and student engagement: A literature review. *School Libraries

Worldwide*, *22*(2), 23-39. doi:10.14265.22.2.03

Caraway, K., Tucker, C. M., Reinke, W. M., & Hall, C. (2003). Self-efficacy, goal orientation,

and fear of failure as predictors of school engagement in high school students.

Psychology in the Schools, *40*(4), 417-427.

Carver, L. B. (2016). Teacher perception of barriers and benefits in K-12 technology usage. *Turkish Online Journal of Educational Technology, 15*(1), 110-116.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate behavioral research, 1*(2), 245-276.

Center for Media Literacy. (2015). *Media Literacy: A definition and more*. Retrieved from http://www.medialit.org/media-literacy-definition-and-more

Cervantes, B., Hemmer, L., & Kouzekanani, K. (2015). The impact of project-based learning on minority student achievement: implications for school redesign. *Education Leadership Review of Doctoral Research*, *2*(2), 50–66.

Christensen, C. M., Johnson, C. W., & Horn, M. B. (2008). *Disrupting class*. New York, NY: McGraw-Hill Professional Publishing.

Chu, K. W. S. (2009). Inquiry project-based learning with a partnership of three types of teachers and the school librarian. *Journal of the American Society for Information Science & Technology*, *60*(8), 1671–1686. https://doi.org/10.1002/asi.21084

Civic Impulse. (2017). *H.R. 347—113th congress: 21st century readiness act*. Retrieved from https://www.govtrack.us/congress/bills/113/hr347

Clark, I. (2012). Formative assessment: Assessment is for self-regulated learning. *Educational Psychology Review*, *24*(2), 205-249.

Couros, G. (2015). *The innovator's mindset: Empower learning, unleash talent, and lead a culture of creativity*. San Diego, CA: Dave Burgess Consulting, Inc.

Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed method approaches* (3rd ed.). Thousand Oaks, CA: Sage.

Creswell, J. W. (2015). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Boston: Pearson.

Crow, S. R. (2009). *Exploring the experiences of upper elementary school children who are intrinsically motivated to seek information*. (Doctoral dissertation) Available from PQDT Open. (UMI No. 3351251)

Curry, K., Mwavita, M., Holter, A., & Harris, E. (2016). Getting assessment right at the classroom level: Using formative assessment for decision making. *Educational Assessment, Evaluation & Accountability, 28*(1), 89-104. doi:10.1007/s11092-015-9226-5

Danielson, C. (2013). *The framework for teaching: Evaluation instruction*. Princeton, NJ: The Danielson Group

Deci, E. L., & Ryan, R. M. (2008). Self-determination theory: A macro theory of human motivation, development, and health. *Canadian Psychology/Psychologie Canadienne*, *49*(3), 182-185. doi:10.1037/a0012801

Deeper Learning Competencies. (2013). *What is deeper learning? Deeper learning defined*. Retrieved from http://www.hewlett.org/uploads/documents/Deeper_Learning_Defined__April_2013.pdf

DuFour, R. (2006). *Learning by doing: A handbook for professional learning communities at work* (pp. 43-70). Bloomington, IN: Solution Tree.

Emo, W. (2015). Teachers' motivations for initiating innovations. *Journal of Educational Change*, *16*(2), 171–195. https://doi.org/10.1007/s10833-015-9243-7

Ellis, D. L. (2012). *A new generation: A new model of education in the 21ˢᵗ century* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Order No. 3514160)

Ellis, K. (2004). The impact of perceived teacher confirmation on receiver apprehension, motivation, and learning. *Communication Education*, *53*(1), 1–20.

Ely, R., Ainley, M., & Pearce, J. (2013). More than enjoyment: Identifying the positive affect component of interest that supports student engagement and achievement. *Middle Grades Research Journal; Charlotte, 8*(1), 13–32.

Evans, M., & Boucher, A. R. (2015). Optimizing the power of choice: Supporting student autonomy to foster motivation and engagement in learning. *Mind, Brain, and Education*, *9*(2), 87-91.

Faulkner, J., & Latham, G. (2016). Adventurous lives: Teacher qualities for 21ˢᵗ century learning. *Australian Journal of Teacher Education, 41*(4), 137-150.

Fern, E. F. (1982). *Why do focus groups work: A review and integration of small group process*. Retrieved from Association for Consumer Research website: https://acrwebsite.org/volumes/6044/volumes/v09/NA-09

Field, A. (2013). *Discovering statistics using IBM SPSS statistics.* Thousand Oaks, CA: Sage Publications, Inc.

Flowerday, T., & Schraw, G. (2000). Teacher beliefs about instructional choice: A phenomenological study. *Journal of Educational Psychology*, *92*(4), 634-645.

Flowerday, T., & Schraw, G. (2003). Effect of choice on cognitive and affective engagement. *Journal of Educational Research*, *96*(4), 207-215.

Foundation for Critical Thinking. (2015). *Defining critical thinking*. Retrieved from

    http://www.criticalthinking.org/pages/defining-critical-thinking/766

Freeman, A., Adams Becker, S., Cummins, M., Davis, A., & Hall Giesinger, C. (2017).

    NMC/CoSN Horizon Report: 2017 K–12 Edition. Austin, Texas: The New Media

    Consortium.

Frey, B. B. (2015). *There's a stat for that! What to do & when to do it.* Thousand Oaks,

    California: Sage Publications, Inc.

Friedman, A. M., & Heafner, T. L. (2007). "You think for me, so I don't have to." The effect of a

    technology-enhanced, inquiry learning environment on student learning in 11th-grade

    united states history. *Contemporary Issues in Technology & Teacher Education, 7*(3),

    199-216.

Gillard, S., Gillard, S., & Pratt, D. (2015). A pedagogical study of intrinsic motivation in the

    classroom through autonomy, mastery, and purpose. *Contemporary Issues in Education

    Research, 8*(1), 1-6.

Göksün, D. O., & Kurt, A. A. (2017). The relationship between pre-service teachers' use of 21st

    Century learner skills and 21st Century teacher skills. *Egitim ve Bilim*, *42*(190).

    doi:10.15390/eb.2017.7089

Gordy, X. Z., Jones, E. M., & Bailey, J. H. (2018). Technological innovation or educational

    evolution? A multi-disciplinary qualitative inquiry into active learning

    classrooms. *Journal of the Scholarship of Teaching and Learning, 18*(2), 1-23.

Grant, L., Stronge, J., Xu, X., Popp, P., Sun, Y., & Little, C. (2014). *West Meets East: Best

    Practices from Expert Teachers in the US and China: Best Practices from Expert

    Teachers in the US and China*. Alexandria, Virginia: ASCD.

Great Schools Partnership. (2013). The glossary of education reform: One-to-one. Retrieved

    from: https://www.edglossary.org/one-to-one/

Grundmeyer, T. (2015). How much content do high school students retain? *American Secondary*

    Education; Bowling Green, *44*(1), 62–72.

Harrell, M. C., & Bradley, M. A. (2009). *Data collection methods: Semi-structured interviews*

    and focus groups. Retrieved from Rand Corporation website:

    https://www.rand.org/pubs/technical_reports/TR718.html.

Henriksen, D., Mishra, P., & Fisser, P. (2016). Infusing creativity and technology in 21st century

    education: A systemic view for change. *Journal of Educational Technology &*

    Society, 19(3), 27-37.

Henson, R. K. (2001). Understanding internal consistency reliability estimates: A conceptual

    primer on coefficient alpha. *Measurement and Evaluation in Counseling and*

    Development, 34(3), 177-189.

Herro, D., & Quigley, C. (2016). Innovating with STEAM in middle school classrooms:

    remixing education. *On the Horizon, 24*(3), 190–204. doi:10.1108/oth-03-2016-0008

Hewlett Foundation. (2017). *Education: Deeper learning.* Retrieved from

    https://www.hewlett.org/strategy/deeper-learning/

Hilton, M. (2015). Preparing students for life and work. *Issues in Science and Technology, 31*(4),

    63-66.

Horn, M. B., Staker, H., & Christensen, C. M. (2015). *Blended: Using disruptive innovation to*

    improve schools. San Francisco, California: Jossey-Bass.

Hornstra, L., Mansfield, C., van der Veen, I., Peetsma, T., & Volman, M. (2015). Motivational teacher strategies: The role of beliefs and contextual factors. *Learning Environments Research*, *18*(3), 363–392. doi:10.1007/s10984-015-9189-y

Houser, M. L., & Frymier, A. B. (2009). The role of student characteristics and teacher behaviors in students' learner empowerment. *Communication Education*, *58*(1), 35–53. https://doi.org/10.1080/03634520802237383

Hutcheson, G., & Sofroniou, N. (1999). *The multivariate social scientist*. London: Sage Publications.

iNACOL. (2014). *iNACOL Blended learning teacher competency framework*. Retrieved from https://www.inacol.org/resource/inacol-blended-learning-teacher-competency-framework/

iNACOL. (2015a). Blending learning: The evolution of online and face-to-face education from 2008-2015. Promising practices in blended and online learning series. *International Association for K-12 Online Learning*, 1–20. Retrieved from https://www.inacol.org/resource/blending-learning-the-evolution-of-online-and-face-to-face-education-from-2008-2015/

iNACOL. (2015b). *Keeping pace with K-12 digital learning, 12th edition* (pp. 12-67). Retrieved from http://www.inacol.org/resource/keeping-pace-with-k-12-digital-learning-12th-edition/

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field Methods, 18*(1), 3–20. doi:10.1177/1525822x05282260

Jacobson-Lundeberg, V. (2016). Pedagogical implementation of 21st century skills. *Educational Leadership and Administration: Teaching and Program Development, 27*, 82-100.

Jamieson, S. (2004). Likert scales: How to (ab) use them. *Medical Education*, *38*(12), 1217-1218.

Johnson, P. (2009). The 21st century skills movement. *Educational Leadership*, *67*(1), 11.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational researcher*, *33*(7), 14-26.

Jolliffe, I. (2011). *International Encyclopedia of Statistical Science*. Berlin, Heidelberg: Springer.

Jones, V. R. (2015). 21st century skills: Communication. *Children's Technology and Engineering, 20*(2), 28-29.

Kafyulilo, A., Fisser, P., & Voogt, J. (2015). Factors affecting teachers' continuation of technology use in teaching. *Education and Information Technologies*, *21*(6), 1535–1554. doi:10.1007/s10639-015-9398-0

Kim, E. (2015). Effect of discussion activities and interactions with faculty to mediate self-directed learning capability on learning outcomes of college students. *KEDI Journal of Educational Policy, 12*(2), 173-196.

Kim, C., Kim, M. K., Lee, C., Spector, J. M., & DeMeester, K. (2013). Teacher beliefs and technology integration. *Teaching and Teacher Education*, *29*, 76–85. https://doi.org/10.1016/j.tate.2012.08.005

Kingston, A. (2014). *Get ready for generation z*. Retrieved from Maclean's website: http://www.macleans.ca/society/life/get-ready-for-generation-z/

Koh, J. (2016). *When choice is motivating: The moderating effects of contextual and individual factors* (Doctoral dissertation). Available from ProQuest Dissertations & Theses Global. (1767228324).

Koh, K. H., Tan, C., & Ng, P. T. (2012). Creating thinking schools through authentic assessment: The case in Singapore. *Educational Assessment, Evaluation and Accountability, 24*(2), 135-149.

Ladd, G. W., & Dinella, L. M. (2009). Continuity and change in early school engagement: Predictive of children's achievement trajectories from first to eighth grade? *Journal of Educational Psychology, 101*(1), 190–206. doi:10.1037/a0013153.

Lemley, J. B., Schumacher, G., & Vesey, W. (2014). What learning environments best address 21st century students' perceived needs at the secondary level of instruction? *NASSP Bulletin, 98*(2), 101-125.

Lever, J., Krzywinski, M., & Altman, N. (2017). Points of significance: Principal component analysis. *Nature Methods, 14*, 641-642.

Lichtman, M. (2012). *Qualitative research in education: A user's guide*. Thousand Oaks, California: Sage publications, Inc.

Mabary, T. G. (2017). *Values, moral, and character education in colonial America through the nineteenth century: A qualitative historical study* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Order No. 10267444)

Marshall, C., & Rossman, G. B. (2015). *Designing qualitative research* (6th ed.). Thousand Oaks, California: Sage Publications, Inc.

Marzano, R. J. (2010). *The art and science of teaching: A comprehensive framework for effective instruction*. Alexandria, Virginia: ASCD.

Maxwell, J. A. (2012). *Qualitative research design: An interactive approach* (Vol. 41). Thousand Oaks, California: Sage publications.

Mega, C., Ronconi, L., & De Beni, R. (2014). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology, 106*(1), 121-131.

Mertler, C. (2016). *Introduction to educational Rresearch*. Los Angeles, CA: Sage Publications.

Merton, R. K., Fiske, M., & Kendall, P. L. (1990). *The focused interview*. New York, NY: The Free Press.

Mitchell, G. W., Skinner, L. B., & White, B. J. (2010). Essential soft skills for success in the twenty-first century workforce as perceived by business educators. *Delta Pi Epsilon Journal; Little Rock, 52*(1), 43–53.

Morgan, D. L. (1998). *Planning focus groups*. Thousand Oaks, CA: Sage.

National Research Council. (2013). *Education for life and work: Developing transferable knowledge and skills in the 21st century.* Retrieved from The National Academies of Sciences Engineering Medicine website: https://www.nap.edu/catalog/13398/education-for-life-and-work-developing-transferable-knowledge-and-skills

Nisha, S. M., & Rajasekaran, V. (2018). Employability skills: A review. *IUP Journal of Soft Skills, 12*(1), 29-37.

Noguera, P., Darling-Hammond, L., & Friedlaender, D. (2015). Equal opportunity for deeper learning. Deeper learning research series. *Jobs for the Future*, 1-21. Retrieved from Jobs for the Future website: http://www.jff.org/publications/equal-opportunity-deeper-learning

Núñez, J. L., & León, J. (2015). Autonomy support in the classroom. *European Psychologist*, *20*(4), 275-283. doi:10.1027/1016-9040/a000234

Osborne, J. W., & Costello, A. B. (2004). Sample size and subject to item ratio in principal components analysis. *Practical Assessment, Research & Evaluation, 9*(11), 8.

Pahomov, L. (2014). *Authentic learning in the digital age: Engaging students through inquiry*. Alexandria, Virginia: ASCD.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and Policy in Mental Health and Mental Health Services Research*, *42*(5), 533-544.

Partnership for 21st Century Learning (P21). (2007). *About us: Our vision and mission.* Retrieved from http://www.p21.org/about-us/our-mission

Partnership for 21st Century Learning (P21). (2015). *P21 framework definitions.* Retrieved from http://www.p21.org/storage/documents/docs/P21_Framework_Definitions_New_Logo_2015.pdf

Partnership for 21st Century Learning (P21). (2016). *Framework for 21st century learning.* Retrieved from http://www.p21.org/storage/documents/docs/P21_framework_0816.pdf

Partnership for 21st Century Learning. (2017). *P21 launches skills for today week to highlight importance of 21st century learning and the 4cs*. Retrieved from http://www.p21.org/news-events/press-releases/2173-p21-launches-skills-for-today-week-to-highlight-importance-of-21st-century-learning-and-the-4cs

Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health, 29*(5), 489-497.

Pulfrey, C., Darnon, C., & Butera, F. (2013). Autonomy and task performance: Explaining the impact of grades on intrinsic motivation. *Journal of Educational Psychology*, *105*(1), 39–57. https://doi.org/10.1037/a0029376

Ravitch, S. M., & Riggan, M. (2016). *Reason & rigor: How conceptual frameworks guide research*. Thousand Oaks, California: Sage publications.

Royer, D. J., Lane, K. L., Cantwell, E. D., & Messenger, M. L. (2017). A systematic review of the evidence base for instructional choice in k–12 settings. *Behavioral Disorders*, *42*(3), 89–107.

Roberts, P., Priest, H., & Traynor, M. (2006). Reliability and validity in research. *Nursing Standard, 20*(44), 41–45.

Ruddell, N. (2017). *The lived experiences of leading edge certified elementary school teachers who use instructional technology to foster critical thinking, collaboration, creativity, and communication in their classrooms: A phenomenological study* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database. (Order No. 10268943)

Rury, J. L. (2013). *Education and social change: Contours in the history of American schooling.* New York: Routledge.

Sadaf, A., Newby, T. J., & Ertmer, P. A. (2016). An investigation of the factors that influence preservice teachers' intentions and integration of web 2.0 tools. *Educational Technology Research and Development, 64*(1), 37–64. https://doi.org/10.1007/s11423-015-9410-9

Saeki, E., & Quirk, M. (2015). Getting students engaged might not be enough: The importance of psychological needs satisfaction on social-emotional and behavioral functioning among early adolescents. *Social Psychology of Education, 18*(2), 355-371. doi:10.1007/s11218-014-9283-5

Schuitema, J., Peetsma, T., & van der Veen, I. (2012). Self-regulated learning and students'

    perceptions of innovative and traditional learning environments: A longitudinal study in

    secondary education. *Educational Studies, 38*(4), 397–413.

    doi:10.1080/03055698.2011.643105

Scrabis-Fletcher, K., & Silverman, S. (2017). Student perception of competence and attitude in

    middle school physical education. *Physical Educator, 74*(1), 85–103.

Sharkey, J., & O'Connor, L. (2013). Establishing twenty-first-century information

    fluency. *Reference & User Services Quarterly, 53*(1), 33-39.

Smith, W. R. (2015). *How to launch PLCs in your district*. Bloomington, IN: Solution Tree

    Press.

Spruce, R., & Bol, L. (2014). Teacher beliefs, knowledge, and practice of self-regulated learning.

    Metacognition and Learning, 10(2), 245–277. doi:10.1007/s11409-014-9124-0

Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences* (4th ed.)*.* Hillsdale,

    NJ: Erlbaum.

Sullivan, S. C., & Downey, J. A., (2015). Shifting educational paradigms: From traditional to

    competency-based education for diverse learners. *American Secondary Education, 43*(3),

    4-19.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of*

    Medical Education, *2*, 53-55.

Thompson, M., & Beymer, P. (2015). The effects of choice in the classroom: Is there too little or

    too much choice? *Support for Learning, 30*(2), 105-120.

Trilling, B., & Fadel, C. (2012). *21st century skills: Learning for life in our times*. San Francisco,

    CA: Jossey-Bass.

University of Illinois. (2008, October 15). *Digital literacy definition and resources*. Retrieved
  from http://www.library.illinois.edu/diglit/definition.html

Upadyaya, K., & Salmela-Aro, K. (2013). Development of school engagement in association
  with academic success and well-being in varying social contexts: A review of empirical
  research. *European Psychologist, 18*(2), 136–147.

Vander Ark, T. (2018). The problem is wasted time, not screen time. *Education Next, 18*(1). 1-7.

Vaughan, N. (2014). Student engagement and blended learning: Making the assessment
  connection. *Education Sciences, 4*(4), 247–264. doi:10.3390/educsci4040247

Voogt, J., Erstad, O., Dede, C., & Mishra, P. (2013). Challenges to learning and schooling in the
  digital networked world of the 21st century. *Journal of Computer Assisted
  Learning, 29*(5), 403-413. doi:10.1111/jcal.12029

Wagner, T. (2012). *Creating innovators: The making of young people who will change the
  world*. New York: Scribner.

Wang, M., & Eccles, J. S. (2013). School context, achievement motivation, and academic
  engagement: A longitudinal study of school engagement using a multidimensional
  perspective. *Learning and Instruction, 28*, 12-23. doi:10.1016/j.learninstruc.2013.04.002

Webster, M. D. (2017). Philosophy of technology assumptions in educational technology
  leadership. *Journal of Educational Technology & Society, 20*(1), 25-36.

Westberg, K. L., & Leppien, J. H. (2018). Student independent investigations for authentic
  learning. *Gifted Child Today, 41*(1), 13-18.

Wigner, A. (2017). *The maker movement, the promise of higher education, and the future of
  work* (Doctoral dissertation). Retrieved from ProQuest Dissertations and Theses database.
  (Order No. 10272530)

Wold, S., Esbensen, K., & Geladi, P. (1987). Principal component analysis. *Chemometrics and Intelligent Laboratory Systems, 2*(1-3), 37-52.

Wright, G. A., & Jones, M. D. (2018). Innovation in the elementary classroom. *Technology and Engineering Teacher, 77*(5), 8-13.

Zumbrunn, S., Marrs, S., & Mewborn, C. (2015). Toward a better understanding of student perceptions of writing feedback: A mixed methods study. *Reading and Writing, 29*(2), 349–370. doi:10.1007/s11145-015-9599-3

Zhao, L. (2015). Teaching strategies of enhancing motivation among ethnic minority students. *Theory and Practice in Language Studies; London*, *5*(10), 2176–2182.

Appendix A

Informed Consent

Amy C. Ackley
NNU Graduate Education, 623 S. University Blvd., Nampa, ID 83686

<u>**INFORMED CONSENT**</u>

PARTICIPANT'S NAME (Please Print) _____

HOMEROOM TEACHER (Please Print) _____

I have read the attached letter regarding Mrs. Amy Ackley's research and I am aware of the following:

- Participating 4th and/or 5th grade students will be asked to fill out a survey, and may be asked to participate in a peer focus group looking at the role student choice and technology play in assessment.
- Regardless of my child's participation, no negative repercussions will occur. The choice to have my child participate or not participate has no bearing on my student's grades, permanent record, or status in school.
- I can stop my child's participation in this study at any time.
- Amy Ackley (the researcher) is available to answer any questions I may have about this study.

I voluntarily agree to let my child participate in this study as follows:

I give consent for my child to participate in this study:

( ) Yes ( ) No

If my child is chosen to participate in a follow-up peer focus groups, I give consent for the focus group to be audio recorded as a part of this study:

( ) Yes ( ) No

I give my consent for direct quotes to be used in this study. No identifying information will be used in the report from this study:

( ) Yes ( ) No

_____   _____

Signature of Study Participant's Parent/Legal Guardian   **Date**

THE NORTHWEST NAZARENE UNIVERSITY HUMAN RESEARCH COMMITTEE HAS REVIEWED THIS PROJECT FOR THE PROTECTION OF HUMAN PARTICIPANTS IN RESEARCH

PLEASE RETURN COMPLETED INFORMED CONSENT TO STUDENT'S HOMEROOM TEACHER OR RESEARCHER. THANK YOU

OFFICE PHONE   EMAIL
208.467.8552   AACKLEY@NNU.EDU

Appendix B

Parental Information Letter

Amy C. Ackley
NNU Graduate Education, 623 S. University Blvd., Nampa, ID 83686

Dear Parent/Legal Guardian:

I am truly excited for the AMAZING opportunity your child's school has to blend technology into their learning environment and instruction. I am an Assistant Professor and faculty member with Northwest Nazarene University's Graduate Education Department. Among my duties, I work with educators on ways to increase personalized learning in their classrooms through curriculum design and the integration of innovative practices into their instruction. I am also a graduate student at NNU, pursuing my Doctoral Ph.D. in Educational Leadership. I am currently conducting my dissertation research, and decided it was the perfect opportunity for me to mix my schooling with my passion.

Your child's school has been focused on increasing student's skillful use of technology, and instilling the confidence needed for them to create and navigate successful paths to personal excellence. Leveraging technology to encourage student reflection and ownership of learning is a necessary and essential skill of 21st century learner. Research regarding 21st century skills and effective instructional approaches involving 1 to 1 classrooms (1 device to every 1 student) is still a relatively new and evolving field, especially at the primary level. My study seeks to identify and explore student perceptions surrounding student choice and autonomy in evidencing learning during student-centered assessments using self-selected technology-based platforms or applications amongst upper elementary students. Your child's class has been selected to participate in my research study. However, in order to proceed with your child's participation, I need your consent.

Participating 4th and/or 5th grade students will be asked to fill out a survey, and possibly participate in a peer focus group looking at the role student choice and technology play in assessment. I do not anticipate any harm to come from your child's participation in this study, and the study will not be a disruption to their educational process. The data collected from this study will be completely confidential and **will not** be used as a part of a school assessment. If for whatever reason you choose not to give your permission, no negative repercussions will occur for you or your child. The choice to participate, or not participate, has no bearing on your student's grades, permanent record, or status in school. If this becomes a published study, be assured that no personally identifying information about your child will be disclosed.

I am excited to watch your child's school lead the way on an issue that affects our nation's educational system. If you have any questions, or need any clarification, please do not hesitate to contact me, **Amy Ackley, by phone at (208) 467-8552 or email at aackley@nnu.edu**. If you need further assistance other resources available are:

██

Please keep this letter for your records, and return the second page which includes your signed consent for your child's participation in study. The attached consent should be returned to your student's homeroom teacher or researcher. Thank you.

Sincerely,

Amy Ackley
NNU Ph.D. Doctoral Student

THE NORTHWEST NAZARENE UNIVERSITY HUMAN RESEARCH COMMITTEE HAS REVIEWED THIS PROJECT FOR THE PROTECTION OF HUMAN PARTICIPANTS IN RESEARCH.

Appendix C

Minor's Assent

Amy C. Ackley
NNU Graduate Education, 623 S. University Blvd., Nampa, ID 83686

MINOR'S ASSENT SCRIPT

You are being asked to help with a project that Mrs. Amy Ackley is completing. She is in school to become a doctor of education and is a professor at Northwest Nazarene University. All the project activities have been explained in detail to your parent(s). Since you are under 18, your parent(s) had to give permission for you to participate. Although you may be too young to give legal consent, you have the right to agree or disagree to participating in this project as well. When a person under the age of 18 agrees to participate in research it is called "assent". If you decide you would like to help with this research, it is important for you to know that you can stop at any time. No one will get mad or behave any differently toward you. The information from this project will be confidential. It has absolutely no effect on your grades, classes, or school records.

As a part of this study, I will be asking you to complete a survey, and possibly asking you to talk with me more with some other classmates in a small group. Your school has an amazing opportunity to mix technology into your classroom learning. In my research, I will be exploring how students feel when they have choice in how they show their learning using the tools they get to choose on their devices. Your responses, along with the responses from other students in the study, will help your school and other schools better understand the needs of students. If you decide to participate, I ask you to answer thoughtfully and honestly. I thank you and really appreciate your time and help.

Will you agree to participate in this research study? If so, please log into the survey using the QR code or link as I come around.

Appendix D

Letter of Full IRB Approval

NORTHWEST
NAZARENE
UNIVERSITY

Amy Ackley <aackley@nnu.edu>

RE: [Northwest Nazarene University] Submission Protocol #2022018 - TO CHOOSE OR NOT TO CHOOSE...IS IT REALLY A QUESTION? A MIXED METHODS STUDY EXPLORING STUDENT CHOICE, ASSESSMENT, AND TECHNOLOGY U...
1 message

Northwest Nazarene University <hrrc@nnu.edu>   Wed, Mar 21, 2018 at 11:33 AM
Reply-To: hrrc@nnu.edu
To: Amy Ackley <aackley@nnu.edu>

Dear Amy,

The IRB has reviewed your protocol: Protocol #2022018 - TO CHOOSE OR NOT TO CHOOSE...IS IT REALLY A QUESTION? A MIXED METHODS STUDY EXPLORING STUDENT CHOICE, ASSESSMENT, AND TECHNOLOGY USE OF THE ELEMENTARY 21st CENTURY LEARNER. You received "Full Approval". Congratulations, you may begin your research. If you have any questions, let me know.

Dr. Jennifer Hill
Northwest Nazarene University
IRB Member
623 S University Blvd
Nampa, ID 83686

You can go here to view the submission:
https://nnu.submittable.com/user/submissions/9714871

Appendix E

National Institutes of Health (NIH) Certification

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Amy Ackley** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 01/17/2017.

Certification Number: 2274807.

Appendix F

Use of P21 Framework for Learning

NORTHWEST NAZARENE UNIVERSITY

Amy Ackley <aackley@nnu.edu>

Re: Use of P21 Framework for Learning in Doctoral Dissertation
1 message

Medina, Mia <mmedina@p21.org>   Fri, Dec 8, 2017 at 9:42 AM
To: Amy Ackley <aackley@nnu.edu>

Hi Amy,

Thank you for your inquiry. P21 is happy to grant permission so long as you follow P21's use of content rules.

All the best,
Mia

Mia Medina
Policy Coordinator
Partnership for 21st Century Learning
One Massachusetts Ave. NW Suite 700
Washington, DC 20001
Tel: 202-798-0755
Twitter: @P21Learning
www.p21.org

On Fri, Dec 8, 2017 at 11:39 AM, Amy Ackley <aackley@nnu.edu> wrote:
Good morning-

I am writing today to request permission to use the *P21 Framework for Learning* as the theoretical framework of my doctoral dissertation. I am a doctoral candidate at Northwest Nazarene University, completing a Ph.D. of Philosophy in Education. As my study centers around student perceptions of choice in evidencing learning using technology-based platforms, *P21's Framework for Learning* supports many of the concepts surrounding the various educational environments and learning factors needed for 21st Century 'student-centered' instruction.

I have reviewed the information provided on the use of P21 content, and am confident that my intended use falls within your criterion. I specifically would like to use the *P21 Framework for Learning* graphic, supply readers with a background and overview of the framework, and refer to the attributes of the framework within my writing.

I thank you in advance for your consideration of this request.

Amy C. Ackley, Ed.S.
Assistant Professor
Graduate Education
Email: aackley@nnu.edu
Telephone: 208.467.8552

NORTHWEST NAZARENE UNIVERSITY

Appendix G

Site Approval Letter: ██████ **School District**

██████████████████████
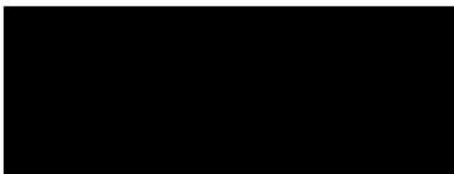
February 21, 2018

To Whom It May Concern:

This letter is written to grant Amy Ackley permission to conduct research within the ██████ School District.

We have reviewed the purpose and methodology of this study and believe it would provide insights that may be beneficial to the school district. The district would be interested in the findings of the research so it can better utilize student choice to increase engagement and student achievement.

This letter here by grants Mrs. Ackley permission to conduct research at ██████ Elementary and ██████ Elementary schools. We look forward to reviewing the results of the study.

Sincerely,

██████████████

Assistant Superintendent
██████ School District

Inspiring Excellence — Every Child, Every Day
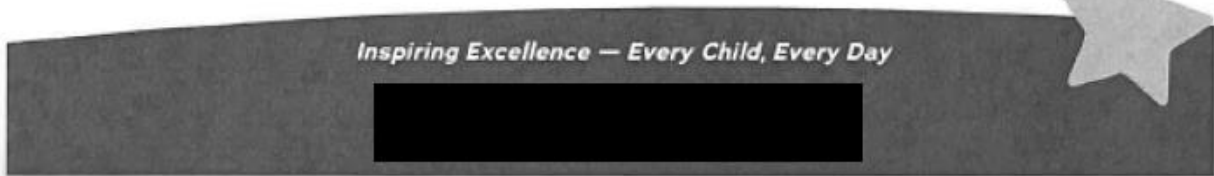
Appendix H

Site Approval Letter: ███████ School District

February, 16, 2018

Northwest Nazarene University
Attention: Institutional Review Board (IRB)
Helstrom Business Center 1st Floor
623 S. University Boulevard
Nampa, ID 83686

RE: Research Proposal Site Access for Mrs. Amy Ackley

Dear IRB Members:

This letter is to inform the IRB that Administration at ███████ School District has reviewed the proposed dissertation research plan including subjects, intervention, assessment procedures, proposed data collection procedures, data analysis, and purpose of the study. Mrs. Ackley has permission to conduct her research in the district of and with students and staff of the ███████ School District. The authorization dates for this research are June 2018 to April 2019.

Respectfully,

Superintendent

<div align="center">

Appendix I

Peer Focus Group Protocol

</div>

Purpose

• To further understand quantitative findings of students' perceptions of:
    ○ self-selected technology choice and student-centered assessments
    ○ choice in evidencing learning using technology-based platforms
    ○ teacher-driven versus student-centered assessments
    ○ personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment

Setting Up the Focus Group

• Contact principal or classroom teacher at participating school. Set up date, time, and location in school for site-based focus group. Provide student list and consent/assent forms for focus group participants. Confirm that all participating classrooms from site are represented with in selected focus group participants.
• Provide the following information to site contact:
    ○ Location for focus group needs to hold facilitator, plus eight to ten students.
    ○ Focus group should last approx. 1 hour.
    ○ Students will receive a small refreshment when participating in focus group. (Possible example: Doughnut, muffins, cookies, etc.)
    ○ Consent/Assent forms for participating students

Things for the Facilitator to Bring to Focus Group
• iPad for recording of focus group session. • Signed consent/assent forms (parent must sign beforehand if student is under age 18) • Small refreshment for focus group participants • Focus group protocol

Conducting the Focus Group
1. As students arrive, have name tags and markers out for students. Allow them to get a snack. 2. Introduce myself as students arrive and let them know we will get started once everyone has arrived. 3. Once everyone has arrived: *Welcome, everyone!* *Thank you for participating in this focus group. Our time together today should last no more than hour today. My name is Amy Ackley. I used to a 5th grade teacher. I am now a professor at university, but also, I am a student just like you. I am working on becoming a doctor in education. As a part of my school work I am looking for your opinions on how you learn best with your devices in the classroom.*

Some of you may not be sure of what a focus group is. A focus group is a group discussion where we gather your opinions. People in focus groups usually have something in common. In your case, you were selected because you completed the student survey portion of this study, have a classroom that has devices, and you have some choice as a part of your learning environment. Otherwise, you were selected randomly. My goal for this group is to hear from you about how you learn best with your devices, and how you feel when you get to choose how you show your learning on your device using some of the platforms/apps/tools you have.

It is important to remember that there are no right or wrong answers and there is no need for us all to agree with each other. It is okay if we have different opinions or ideas. I will be asking questions that will help us focus our conversation, but if someone says something that you want to respond to, I encourage you to do that. The only thing I ask is that we try our very best to only speak one person at a time.

I will be recording our conversation today, partly because I can't possibly write down everything you say. The recording is my note taking system. It will make sure that I report your opinions accurately. This interview recording will not be shared with anyone at your school. I will be using this information to write a report. I may even use quotes from this focus group, but no one from this group will be named. I want to remind you that your participation is this group is completely voluntary. Although you have all shown interest in participating in this group by being here, you are free to not answer specific questions or leave at any time.

4. Start recording: Ask each student to introduce themselves.

Sample Focus Group Questions

As per explanatory sequential design, quantitative research will act as a catalyst for the study's first stage of inquiry. These qualitative semi-structured focus groups will offer depth of information to a study's questions that numerical data may not. The following questions are sample questions of what could be included in the focus group protocol. The final focus group protocol will not be finalized until analysis of quantitative data is completed.

Questions-Introductory:

1. What is special about your classroom?

2. What does your teacher do that helps you to learn?

Questions- General Topic:

1. When using your device, in what kind of activities would you say you are given choice?

2. How do you feel when you get to select how you will show your work on your device? Can you give me an example of a time this happened?

Questions- Depth & Detail:

1. When you have to complete work on your device, do you like when your teacher picks how you have to complete your work, or would you rather decide for yourself? Why?

2. Do you feel you have a better understanding of the content/the assignment when you get select how you will show your work on your device? Why is that?

3. How do you feel your responsibility as a student is different now that you have the option of selecting how you can show your learning in classroom?

4. Because you have had those opportunities to choose for yourself how to show what you know on your devices…What has that made you learn about yourself as a learner? (Tell me more about that…)

5. When you are able to pick for yourself how you will complete an assignment on your device, do you think that will help you score higher?

6. When you are given the opportunity to choose, how do you decide what platform/app/tool to use on your device to complete the assignment the teacher has given to you? Can you give me an example?

7. Is there anything else the group would like to share on this subject? (follow up on ideas for clarity)

Thank students for their participation.

Appendix J

Technology Choice & Academic Efficacy Student Perception Survey

Technology Choice & Academic Efficacy Student Perception Survey
Qualtrics Survey Flow & Sub-Group/Question Numbers

- RQ1: How does self-selected technology choice impact students' perceptions of student-centered assessments?

- RQ2: What are students' perceptions of choice in evidencing their learning using technology-based platforms?

- RQ3: When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?

- RQ4: Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?

Note: The word 'device' can be substituted for a specific name of student devices (example: iPad, tablet, laptop, etc.). The word 'platform' can be substituted for another word more familiar to students (example: app, tool, etc.).

Q41

Q1 (Demographic)
How many years have you had a device assigned to you in your classroom?

1 year (1)
2 years (2)
3 years (3)
4 years (4)
5 years or more (5)

Q2 (Demographic)
I am a:

Male (1)
Female (2)

Q3 (Demographic)
I am:

White (1)
Hispanic/Latino (2)
Black or African American (3)
Asian (4)
Native American or Native Hawaiian (5)
Other (6)

RQ1.Q4: When I have an assignment, choosing how I will finish my work on my device makes my work more enjoyable.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q10: When I am working on an assignment, I would rather use my device than something else like paper and pencil.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q11: I like school work best when I get choice in how I use my device to show what I know.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q12: Even if an assignment is hard for me, choosing the platform/app I want to use can make the assignment easier.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ1.Q13: Being able to choose how to complete an assignment on my device makes me feel like I'm in charge of my learning.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q14: I like my school work best when I can choose to use my device to complete assignments.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q15: I like to choose what platform to use, rather than someone else tell me what platform to use.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q16: When I get a choice in how to finish my work on my device, I know I will grow in my learning.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ1.Q17: Using the platform I want to use on my device helps me to do my best work.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q18: On my device, I like to choose what platform to finish my assignment in.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q19: I learn more when I can choose how to show my work rather than the teacher telling me what to do.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q20: When the teacher gives me choice in what platform to use to complete an assignment, I know I will be able to show my best work.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ1.Q21: I can reach my learning goals when my teacher lets me choose for myself how to complete my assignments on my device.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q22: I will choose a platform for my assignment because it allows me to be creative.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q23: On my device, I would rather choose the platform to finish my work then have the teacher tell me which one I have to use.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q24: When something is hard, being able to choose on my device how to show my work makes me want to work harder on it.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ1.Q25: When I am able to choose how to finish my assignment on my device, I feel like I learn more.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q26: When completing my work on my device, I choose only the platforms that I know I am good at using.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q27: When we use our devices, I enjoy the assignment more when I have a choice in how to complete the work.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q28: No matter how hard an assignment is, if I have a choice in how to show my work, I feel successful.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ1.Q29: When I get to choose how to show my work on my device, it makes the assignment more interesting.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q30: On my device, the more opportunities I get to show my learning, my way, the better I get at it.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q31: When given the chance, I know I can choose the best platform on my device to show my best work.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q32: I am able to show that I am a good student when I get to choose how to show my learning on my device.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q33: I learn better when I get to use my device on an assignment.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q34: Learning can sometimes be hard, but having a choice on my device can make learning easier.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ1.Q35: It's exciting when I get to choose for myself how to complete my assignment on my device.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q36 : When my teacher lets me choose 'my way' to show what I know on my device, I know I will get closer to reaching my goals.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q37: Getting a choice to use my device on my school work allows me to better show what I know to my teacher.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q38: Choosing how to complete my assignments on my device keeps my work from being boring.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q39: Having to choose the best platform to show my work has made me a better problem solver.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ2.Q40: When I get to choose, I think carefully about what platform will show my best work on my device.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ3.Q41: Being able to choose for myself how to complete my assignments on my device lets me show my very best work.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

RQ4.Q42: I feel confident in my ability to choose the best platform for my work.

Very Much Agree (1)
Agree (2)
Neither Agree Nor Disagree (3)
Slightly Disagree (4)
Very Much Disagree (5)

Q43 (Focus Group): I would like to be a part of a follow-up group that meets to give more information to Mrs. Ackley!

Yes (1) If Q43 = Yes
Skip To: Q39

No (2) If Q43 = No
Skip To: End of Survey

Q39 (Focus Group):Thank you! Please type your name below!

First Name (1) _____
Last Name (2) _____

Appendix K

Research Assistant Agreement - Lynnie Hagemeier

Amy C. Ackley
NNU Graduate Education, 623 S. University Blvd., Nampa, ID 83686

RESEARCHER CONFIDENTIALITY AGREEMENT

TO CHOOSE OR NOT TO CHOOSE...IS IT REALLY A QUESTION? A MIXED METHODS STUDY EXPLORING STUDENT CHOICE, ASSESSMENT, AND THE UPPER-ELEMENTARY 21ST-CENTURY LEARNER

I, _Lynnie Hagemeier_ [name of research assistant], agree to assist the primary investigator with this study. I agree to maintain full confidentiality when performing all tasks.

Specifically, I agree to:

- keep all research information shared with me confidential by not discussing or sharing the information in any form or format (e.g., disks, tapes, transcripts) with anyone other than the primary investigator;

- hold in strictest confidence the identification of any individual that may be revealed during the course of performing the research tasks;

- not make copies of any raw data in any form or format (e.g., disks, tapes, transcripts), unless specifically requested to do so by the primary investigator;

- keep all raw data that contains identifying information in any form or format (e.g., disks, tapes, transcripts) secure while it is in my possession. This includes:
    - keeping all digitized raw data in computer password-protected files and other raw data in a locked file;
    - closing any computer programs and documents of the raw data when temporarily away from the computer;
    - permanently deleting any e-mail communication containing the data; and
    - using closed headphones if transcribing recordings;

- give, all raw data in any form or format (e.g., disks, tapes, transcripts) to the primary investigator when I have completed the research tasks;

- destroy all research information in any form or format that is not returnable to the primary investigator (e.g., information stored on my computer hard drive) upon completion of the research tasks.

Please provide the following contact information for research assistant:

Printed name of research assistant: _Lynnie Hagemeier_

Address: ▓▓▓▓▓▓▓▓▓▓▓▓

Telephone number: ▓▓▓▓▓▓▓▓▓▓

Signature of research assistant _Lynnie Hagemeier_ Date _8/20/18_

Printed name of primary investigator _Amy C Ackley_

Signature of primary investigator _Amy C Ackley_ Date _8/20/18_

OFFICE PHONE 208.467.8552   EMAIL AACKLEY@NNU.EDU

Appendix L

Research Assistant Agreement – Stephanie Thomas

Amy C. Ackley
NNU Graduate Education, 623 S. University Blvd., Nampa, ID 83686

RESEARCHER CONFIDENTIALITY AGREEMENT

TO CHOOSE OR NOT TO CHOOSE...IS IT REALLY A QUESTION? A MIXED METHODS STUDY EXPLORING STUDENT CHOICE, ASSESSMENT, AND THE UPPER-ELEMENTARY 21ˢᵗ-CENTURY LEARNER

I, ___Stephanie Thomas___ [name of research assistant], agree to assist the primary investigator with this study. I agree to maintain full confidentiality when performing all tasks.

Specifically, I agree to:

- keep all research information shared with me confidential by not discussing or sharing the information in any form or format (e.g., disks, tapes, transcripts) with anyone other than the primary investigator;

- hold in strictest confidence the identification of any individual that may be revealed during the course of performing the research tasks;

- not make copies of any raw data in any form or format (e.g., disks, tapes, transcripts), unless specifically requested to do so by the primary investigator;

- keep all raw data that contains identifying information in any form or format (e.g., disks, tapes, transcripts) secure while it is in my possession. This includes:
  - keeping all digitized raw data in computer password-protected files and other raw data in a locked file;
  - closing any computer programs and documents of the raw data when temporarily away from the computer;
  - permanently deleting any e-mail communication containing the data; and
  - using closed headphones if transcribing recordings;

- give, all raw data in any form or format (e.g., disks, tapes, transcripts) to the primary investigator when I have completed the research tasks;

- destroy all research information in any form or format that is not returnable to the primary investigator (e.g., information stored on my computer hard drive) upon completion of the research tasks.

Please provide the following contact information for research assistant:

Printed name of research assistant: ___Stephanie Thomas___

Address: ███████████████████

Telephone number: ███████████████

Signature of research assistant ___Stephanie Thomas___ Date ___8/20/18___

Printed name of primary investigator ___Amy C Ackley___

Signature of primary investigator ___Amy C Ackley___ Date ___8/30/18___

OFFICE PHONE   EMAIL
208.467.8552   AACKLEY@NNU.EDU

Appendix M

Content Validity Index – Quantitative Survey

ACKLEY SURVEY CONTENT VALIDITY INDEX													
N/A = NO ANSWER X= LEVEL 3 OR 4 AGREEMENT _=LEVEL 2 OR 1 AGREEMENT													
QUESTION	EXPERT 1	EXPERT 2	EXPERT 3	EXPERT 4	EXPERT 5	EXPERT 6	EXPERT 7	EXPERT 8	EXPERT 9	AGREEMENT	# IN	ITEM CVI	COLLECTED COMMENTS
Demographic Questions													
Collection of student assent (Agreement to survey: Yes, No)	X	N/A	X	X	N/A	N/A	X	X	X		6	66.66%	*Very Relevant, but not sure if the student will remember signing it *I am assuming you will have a full statement here that they answer Yes or No to. Students will not know what assent means.
Please select one of the following: • I would like to be a part of a follow-up group of students that meets and gives more information to Mrs. Ackley (the researcher). • I would not like to be a part of a follow-up group of students that meets and gives more information to Mrs. Ackley (the researcher).	X	N/A	X	X	X	X	X	X	X		8	88.88%	
First and Last Name	X	N/A	X	N/A	X	X	X	X	X		7	77.77%	*Do you need this if they are not going to be part of the group? Are they agreeing o a confidential survey, or an anonymous survey?
How many years have you used a device in your classroom? 1 year 2 years 3 years 4 years More than 5 years	X	X	X	X	X	X	X	X	X		9	100%	*Students transferring in might have difficulty answering this... might need clarification on what devices are included *The word 'device' may need to have some examples. * Students may not identify with the work "device" unless the teacher uses that vocabulary. If all your classrooms have the same device, I's use that word. Otherwise, 'technology' could be more identifiable to this age group. This goes for

												anytime device is mentioned in the survey.
I am a: Male Female Would rather not say	X	X	X	X	X	X	X	X	X	9	100%	
I consider myself: White Hispanic Asian African American Native American Pacific Islander Other Would rather not say	X	X	X	X	X	X	X	X	X	9	100%	
How does self-selected technology choice impact students' perceptions of student-centered assessments?												
• When I have an assignment to finish, being able to choose the technology I want to use can make my assignment easier. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	*"When I am given an assessment, being able…" *Easier or more enjoyable? *Are they choosing the technology? Or are they choosing the platform/application on their device?
• Choosing on my own how to complete an assignment on my device means I am in charge of my learning. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	N/A	X	X	X	X	X	8	88.88%	*Choosing on my own how I will use my device to complete an assignment means I am in charge of my learning. *Just a suggestion, Maybe consider…"Choosing how to complete an assignment on my device makes me feel like I'm in charge of my learning." *"Makes me feel like I am in charge of my learning." * Possible rewording: Choosing on my own how to complete an assignment on my device 'makes me feel like I am in charge' of my learning. *Are you trying to get at if they interpret that having a choice means they are in charge of their learning? OR if they feel in charge of their learning? If it is feeling, I'd change it to: Choosing on my own how to complete an assignment on my device makes me feel that I am in charge of my learning."

Question										Count	%	Notes
• Using the platform/app/tool I want to use on my device helps me to do my best work. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• I can get good grades when my teacher lets me choose for myself how to complete my assignments on my device. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	_	X	X	X	X	X	X	8	88.88%	*We work toward mastery, not grades, so I am not sure they would connect with this question. *I will have to think about whether grades are relevant to your question.
• When I am able to choose how to finish my assignment on my device, I learn more. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	*Possible rewording: When I am able to choose how to finish my assignment on my device, I 'feel like I' learn more.
• When I get to choose how to show my work while using my device, it makes the assignment more interesting. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• It's exciting when I get to choose for myself how to complete my assignment on my device. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	_	X	X	8	88.88%	Perhaps more appropriate under: What are students' perceptions of choice in evidencing their learning using technology-based platforms?
What are students' perceptions of choice in evidencing their learning using technology-based platforms?												*I wonder if asking this set first might help them answer the preceding set? Seems like starting with tech vs. other methods is easier than choice within tech?
• If I have to finish an assignment, I would rather use my device than something else like paper and pencil. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Agree)	X	X	X	X	X	N/A	X	X	X	8	88.88%	*Maybe instead of when I have to finish an assignment, but "When I am working on an assignment…"
• I like my school work best when I can choose to use my device to complete assignments. (Very Much Agree, Agree, Neither Agree or Disagree,	X	X	X	X	X	x	X	X	X	9	100%	

Slightly Disagree, Very Much Disagree)											
• On my device, I like to choose what platform/app/tool to finish my assignment in. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	x	X	X	X	9	100%	
• I will choose a platform/app/tool for my assignment because it allows me to be creative. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• When completing my work on my device, I choose only platforms/apps/tools that I know I am good at using. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	*This is a good growth mindset question. I'd be interested in how you will interpret the answers in relation to your research question.
• When given the chance, I know I can choose the best platform/app/tool on my device to show my best work. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• I learn better when I get to use my device on an assignment. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• Getting a choice to use my device on my school work allows me to better show what I know to my teacher. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• When I get to choose, I think carefully about what platform/app/tool will show my best work on my device. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	_	X	X	8	88.88%	*This is a good question

When using technology-based platforms, what are students' perceptions regarding teacher-driven assessments versus student-centered assessments?												
• I like school work best when I get choice in how I use my device to show what I know. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	* I think this is a repeat question.
• When using technology, I like to choose what platform/app/tool to use, rather than someone else telling me what platform/app/tool to use. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	*Consider making these easier to read…I'm having to read them twice and I wonder what a 10 year-old is going to do. *This one is very similar to the one 3 below.
*Sometimes, being able to choose how to show what I know on my device can be hard, but overall it is worth it. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	_	X	X	X	_	X	X	7	77.77%	*Will they be able to decide if it is "worth it"? *Consider making these easier to read…I'm having to read them twice and I wonder what a 10 year-old is going to do. * This is a good question * I have concerns that this question is actually asking two things. What if students don't think it is hard to choose a device yet they do feel it is worth it (or visa versa)? Students do feel it is hard to choose a device and it is not worth it? There is too much assumption in this question. Perhaps this needs reworded to focus on if the choice is worth it. * There are really 2 questions here that could be answered differently. Do I perceive it to be harder than traditional methods? Do I think it is worth it?
• I learn a lot more when I have to choose how to show my work rather than the teacher telling me what to do. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	N/A	X	X	X	X	X	8	88.88%	*I learn more when I can choose how to show my work rather than the teacher telling me what to do." * "I learn a lot more when I get to choose how to show my work…"

Item										Count	%	Comments
• When using my device, I would rather choose the platform/app/tool to complete my work then have the teacher tell me which one I have to use. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	*This one is very similar to the one 3 above.
• When we use our devices, I enjoy the activity more when I have a choice in how to complete the work. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• Being able to choose how to complete my assignment on my device keeps my assignment from being boring. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	X	X	X	X	X	X	9	100%	
• The main thing I want when I do my school work is to show how good I am at it. Being able to choose for myself how to complete my assignment on my device lets me do that. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	_	X	X	X	X	X	X	8	88.88%	*Being able to choose for myself how to complete my assignment on my device lets me show my very best work.
Are student's perceptions of personal academic efficacy impacted by the ability to self-select a technology-based platform to complete a student-centered assessment?												
• If a subject is hard for me, choosing the platform/app/tool I want to use can make my assignment easier. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	*Will you interpret this from a growth mindset perspective, or an academic rigor perspective?

Item										Count	%	Comments
• When I get to choose how to finish my work on my device, I know I will be able to do well on the assignment. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	_	x	X	X	X	X	X	8	88.88%	*Not sure they will always d well if it is something they are still working on mastering. *Again, consider maybe making this simpler for 10 year olds.
• When the teacher gives me choice about what platform/app/tool to use when completing an assignment, I know I will be able to show my best work. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	
• When something is hard, being able to choose how to show my work on my device makes me want to work harder on it, not less. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	*I would eliminate "not less" at the end * Suggestion to remove "not less" from end of question. *Will you interpret this from a growth mindset perspective, or an academic rigor perspective?
• No matter how hard an assignment is, having a choice in how I decide to show my work makes a difference. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	_	x	X	X	X	X	X	8	88.88%	*…makes a difference in how difficult I feel the assignment is. * Maybe something like…"No matter how hard an assignment is, if I have a choice in how to show my work I feel successful."
• On my device, the more opportunities I get to show my learning, my way, the better I get at it. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	
• I am able to show that I am a good student when I can choose how to show my learning on my device. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	
• Learning can be a challenge, but having choice on my device makes it easier. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	_	X	X	8	88.88%	*"Learning sometimes can be hard…" * I have the same concern on this question as I did above. If students don't think learning is a challenge yet they like choice, how will they answer this?

• When my teacher lets me choose my own way to show what I know on my device, I know I will reach my goal. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	*…get closer to reaching my goal.
• Choosing for myself what platform/app/tool would be best to show my work can be hard, but I am getting better at problem solving. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	_	X	X	8	88.88%	*And Again on this question
• I feel confident in my ability to choose the best platform/app for my work. (Very Much Agree, Agree, Neither Agree or Disagree, Slightly Disagree, Very Much Disagree)	X	X	X	x	X	X	X	X	X	9	100%	
										3355.45	94.85%	

Appendix N

Principal Components Analysis Correlation Matrix

	RQ1.Q35	RQ2.Q18	RQ2.Q37	RQ3.Q41	RQ4.Q32	RQ4.Q42	RQ4.Q30	RQ2.Q31	RQ2.Q22	RQ3.Q15	RQ3.Q27	RQ4.Q12	RQ2.Q14	RQ2.Q40	RQ2.Q26	RQ1.Q4
RQ1.Q35	1.000	.384	.352	.388	.361	.386	.286	.272	.245	.400	.332	.259	.321	.328	.197	.166
RQ2.Q18	.384	1.000	.289	.315	.265	.260	.335	.233	.347	.416	.362	.324	.295	.181	.183	.188
RQ2.Q37	.352	.289	1.000	.410	.394	.373	.350	.271	.281	.106	.146	.261	.362	.175	.159	.278
RQ3.Q41	.388	.315	.410	1.000	.313	.408	.356	.309	.271	.209	.187	.141	.216	.242	.243	.141
RQ4.Q32	.361	.265	.394	.313	1.000	.376	.284	.317	.221	.261	.224	.206	.272	.238	.126	.201
RQ4.Q42	.386	.260	.373	.408	.376	1.000	.276	.269	.205	.157	.154	.137	.213	.359	.165	.198
RQ4.Q30	.286	.335	.350	.356	.284	.276	1.000	.200	.309	.229	.337	.313	.163	.230	.176	.109
RQ2.Q31	.272	.233	.271	.309	.317	.269	.200	1.000	.153	.242	.202	.280	.164	.263	.199	.193
RQ2.Q22	.245	.347	.281	.271	.221	.205	.309	.153	1.000	.220	.263	.324	.183	.161	.134	.179
RQ3.Q15	.400	.416	.106	.209	.261	.157	.229	.242	.220	1.000	.316	.242	.138	.180	.167	.106
RQ3.Q27	.332	.362	.146	.187	.224	.154	.337	.202	.263	.316	1.000	.233	.163	.238	.108	.120
RQ4.Q12	.259	.324	.261	.141	.206	.137	.313	.280	.324	.242	.233	1.000	.189	.187	.166	.169
RQ2.Q14	.321	.295	.362	.216	.272	.213	.163	.164	.183	.138	.163	.189	1.000	.177	.171	.303
RQ2.Q40	.328	.181	.175	.242	.238	.359	.230	.263	.161	.180	.238	.187	.177	1.000	.165	.152
RQ2.Q26	.197	.183	.159	.243	.126	.165	.176	.199	.134	.167	.108	.166	.171	.165	1.000	.013
RQ1.Q4	.166	.188	.278	.141	.201	.198	.109	.193	.179	.106	.120	.169	.303	.152	.013	1.000