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# 1:1 Chromebooks In High School Classrooms: Teacher Perceptions Of Integration Efforts

Jason Saltmarsh
*University of New England*

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1:1 CHROMEBOOKS IN HIGH SCHOOL CLASSROOMS:

TEACHER PERCEPTIONS OF INTEGRATION EFFORTS

By

Jason Saltmarsh

BA (Keene State College) 1992

MA Ed (University of Massachusetts, Lowell) 2002

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Jason Saltmarsh
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## ABSTRACT

The purpose of this qualitative narrative inquiry study was to fully explore high school teachers' perceptions of their experiences teaching in a 1:1 Chromebook environment. Data included high school teachers' personal narratives detailing their experiences and observations about the use of 1:1 Chromebooks to support teaching and learning. Study data also included in-depth interviews with eight high school teachers. The four constructs of the Unified Theory of Acceptance and Use of Technology provided a theoretical framework for this study. Educational leaders face significant challenges in understanding the considerable impact of teachers' perceptions of their decision to integrate and effectively use 1:1 Chromebooks with their students. This study provides insight into resolving those difficulties and indicates ways in which schools can support and facilitate 1:1 Chromebook usage and stimulate pedagogical change. Throughout this narrative study, several emergent themes surfaced; (a) instructional effectiveness, (b) professional learning (c) student engagement, (d) performance expectancy, (e) effort expectancy, (f) social influence, and (g) facilitating conditions. The findings of this narrative study may help educational leaders better understand the facilitating conditions necessary to promote pedagogical transformation in a 1:1 Chromebook environment.

*Keywords*: Chromebooks, high school, student engagement, professional development, UTAUT, teachers' perceptions, technology integration, one-to-one

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This dissertation was presented
by



Jason Saltmarsh



It was presented on
March 04, 2021
and approved by:



Jacqueline Lookabaugh, Ed.D.
Lead Advisor
University of New England


Catherine Stieg, Ed.D.
Secondary Advisor
University of New England


Caroline Arakelian, Ph.D.
Affiliate Committee Member
NH School Administrative Unit 21

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**CHAPTER 1: INTRODUCTION**

Schools across the United States continue to spend increasing amounts of money on Chromebooks for students. However, research shows that they have little effect on improving student achievement (Cuban, 2006; Gallagher-Landis, 2017; Penuel, 2006). In 2015, primary and secondary schools in the United States spent $4.9 billion on tablets, laptop, and desktop computers (Singer, 2016). In 2018, Coastal High School (a pseudonym) spent approximately $325 per student to purchase Chromebooks for all 305 incoming ninth-grade students. The stated goals of the Chromebook 1:1 program at Coastal High School is to boost academic achievement in preparation for postsecondary schools, to develop the necessary technical skills to gain employment after graduation, and to provide equitable technology access for all students (Chromebook Program - IT Services, 2020).

Coastal High School (CHS) is an award-winning, 4-year, comprehensive public high school in New Hampshire. CHS was named New Hampshire High School of Excellence in 2017 (Tetrault, 2017) and was recognized as a Top 100 High School in the United States (Sullivan, 2018). Coastal High School is currently entering the sixth year of student Chromebook deployments. Unfortunately, changes to pedagogy at Coastal High School have not been widespread according to the researcher's own observations. Like many teachers across the United States, CHS teachers do not intentionally and routinely utilize students' Chromebooks, online resources, and GSuite applications to support their instruction (Gallagher-Landis, 2017). The time, expense, and efforts put forth to provide educators and students with a dependable one-to-one laptop program is quite substantial (Khan, 2019), and yet some teachers continue to think that student laptops are unnecessary and possibly even detrimental (Aaron & Lipton, 2018; Tagsold, 2013) to teaching and learning.

Determining the reasons for the difference in expectations of the Chromebook 1:1 program and the classroom realities is a topic worthy of further investigation (Islam & Grönlund, 2016; Shafer, 2017). This narrative inquiry study explored the perceptions of individual teachers based upon their personal stories of teaching in the 1:1 Chromebook environment at Coastal High School (CHS). Data were gathered from individual teachers through semi-structured interviews designed to reveal their unique stories and personal experiences.

School leaders and educational policymakers can provide the resources, funds, and support necessary to support a 1:1 Chromebook program if they are aware of their teachers' needs and wants. Teachers who feel supported by their administrators will be more likely to take chances and experiment with new methods and approaches (Maninger & Holden, 2009). This study will help inform all stakeholders in the CHS community about teacher perceptions of Chromebook usage, professional development surrounding Chromebook integration, and the effect of 1:1 devices on student engagement.

Chapter 1 provides the rationale for this narrative inquiry study on the use of Chromebooks in a 1:1 high school environment. The problem and the purpose of this study are presented along with the theoretical framework. Data collection and analysis methods are reviewed, the essential research questions, limitations and assumptions are disclosed.  Finally, the significance of this study and a few helpful definitions of relevant terminology are provided along with a chapter summary.

## Statement of the Problem

The introduction of laptops alone does not induce instructional change (Bebell & Kay, 2010). Operational planning and sustained professional learning are necessary to provide

teachers with the knowledge, skills, and beliefs to increase technology adoption. The Coastal High School community provided educators and students with a dependable 1:1 laptop program with significant investment and the belief that a 1:1 Chromebook environment would improve educational outcomes. However, based upon the researcher's observations, instructional change has been inconsistent and sporadic across all departments at CHS, as evidenced by the number of teachers who ask students to turn off their Chromebooks when entering their classrooms.

The problem of study was the gap in the research literature on high school teachers' perceptions of their individual experiences teaching students in a 1:1 Chromebook environment. There is little doubt that technology can expand curriculum and support student engagement (Keengwe, Schnellert, & Mills, 2012). However, school leaders need to understand teachers' perceptions and the realities of Chromebook integration so that they may provide the necessary resources and support.

**Purpose of the Study**

As suggested by Shafer (2017), further research is needed to understand what factors or processes should be present to better support teachers in a 1:1 environment. Additional research is also needed to better understand the role of the teacher, the facilitating conditions required to successfully integrate 1:1 technology, and the impact they have on students (Islam & Grönlund, 2016). The purpose of this qualitative narrative inquiry study was to fully explore teachers' lived experiences teaching in the 1:1 Chromebook environment at CHS.

This researcher is hopeful that findings from this narrative inquiry study might inform school administrators, board members, and other stakeholders in the school community about teachers' perceptions regarding the use of 1:1 Chromebooks to support teaching and learning at

CHS. Teachers can offer unique insight regarding curricular and instructional reforms (Barth, 2001; Hart, 1995) where it matters most, in the classroom. By sharing these teachers' personal stories and authentic experiences, the researcher sought to discover how Chromebooks are being used to support instruction at CHS.

**Research Questions**

The following research questions guided this study to explore teachers' perceptions of their experiences in the 1:1 Chromebook environment at Coastal High School:

**RQ1**: What are the CHS teachers' perceptions of the effectiveness of 1:1 Chromebook environments as an instructional tool?

**RQ2**: What, if any, professional learning and or training has been most effective in changing instructional methodology to include student Chromebooks as perceived by CHS teachers?

**RQ 3**: What impact has the 1:1 use of Chromebooks had on student engagement as perceived by CHS teachers?

## Conceptual Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) provided the theoretical framework for this research. Developed by Venkatesh et al. (2003), UTAUT is a synthesis of eight existing models used to predict the likelihood of successful technology implementation. UTAUT was formed through integration and refinement of the following theories: (a) the theory of reasoned action, (b) the technology acceptance model, (c) the motivation model, (d) the theory of planned behavior, (e) the model of PC utilization, (f) the innovation diffusion theory, (g) social cognitive theory, and (h) a

combination of the theory of planned behavior and the technology acceptance model

(Williams, Rana, & Dwivedi, 2015, p. 444).

The UTAUT model consists of four constructs: (a) performance expectancy, (b) effort

expectancy, (c) social influence, and (d) facilitating conditions (Venkatesh et al., 2003). The

first three constructs are focused on behavioral intentions, and the fourth is concerned with

environmental and organizational factors and the degree to which they facilitate the use of

technology. The research questions in this study of teachers' perceptions of the 1:1

Chromebook environment at Coastal High School align well with these four areas of inquiry.

| | |
|---|---|
| **RQ1**: What are the CHS teachers' perceptions of the effectiveness of 1:1 Chromebook environments as an instructional tool? | Performance Expectancy<br>Social Influence |
| **RQ2**: What, if any, professional learning and or training has been most effective in changing instructional methodology to include student Chromebooks as perceived by CHS teachers? | Effort Expectancy<br>Social Influence |
| **RQ 3**: What impact has the 1:1 use of Chromebooks had on student engagement as perceived by CHS teachers? | Performance Expectancy<br>Social Influence |

*Figure 1*. Alignment of research questions and the four constructs of UTAUT

Venkatesh et al. (2003) considered performance expectancy to be the degree to which

one believes that using the system will improve performance. Effort expectancy is concerned

with the ease of use of the system by participants. Social influence is concerned with the

expectation of others to see the new technology systems being utilized.  Facilitating conditions

is defined as the degree to which one believes that an organizational and technical infrastructure exists to support the use of technology.

UTAUT (Venkatesh et al., 2003) provided a lens for the researcher to consider how much teachers value Chromebooks as instructional tools, the ease they can use them to support their curriculum, the pressure they feel from others within the organization to modify their teaching methods and integrate technology, and finally the technical structure that exists to facilitate and control the use of these wireless computing devices.

## Assumptions, Limitations, and Scope

Coastal High School is currently entering the sixth year of student Chromebook deployments. The researcher assumed that many of the Coastal High School teachers were familiar with Chromebooks and were using technology to support their daily instruction. Provided that participants in this study have experience teaching in a 1:1 Chromebook environment, the researcher also assumed that they would be able to provide detailed information to help answer the three research questions in this study.

The researcher also assumed that all participants would act in an ethical manner providing truthful responses to the interview questions and that participants reflected upon their professional practice and experiences teaching and learning in a 1:1 Chromebook environment.  Finally, it was assumed that participants' attitudes, perceptions and experiences represented the faculty of CHS.

Limitations are features of a study beyond the researcher's control that can negatively affect the results or ability to generalize (Roberts, 2010). In this study, the limited sample size of 8 reduced the ability to generalize the findings of this study to apply to other schools. The unique characteristics of the CHS population may also make any general application difficult

when considering transferability. For example, the size of the school population, the ratio of students to teachers, the students' socioeconomic levels, and the educational attainment levels of the teaching staff all possibly made this school differ from other schools. Another limitation was the interview process itself. There was potential for participants to misunderstand questions or for the researcher to misinterpret responses. The researcher moderated this risk by asking participants to review transcripts of their interviews and allowed for clarification if needed.

As a former elementary and secondary classroom teacher and current technology director, the researcher's interest in educational technology is both personal and professional. The researcher was first introduced to 1:1 learning in 2006 when asked to lead the Maine Learning Technology Initiative (MLTI, Zheng et al., 2016) 1:1 laptop program in a high-performing school district in Maine. Since that time, the researcher has also launched and supported 1:1 initiatives in two New Hampshire school districts. In each of these learning communities, the researcher has witnessed teachers struggle in their attempts to successfully incorporate new technologies and alter their pedagogical approach to teaching and learning.

This study was conducted at the high school where the researcher is employed. The researcher recognized that his position as an administrator could have caused some reluctance among the teaching staff to be open and honest about their views and behaviors concerning technology and pedagogy, especially if they felt those views contradicted the mission of the school. However, the researcher was not directly responsible for managing or evaluating teachers at CHS. The information technology services department provides support and service to educators. Based upon prior interactions, the researcher believes that teachers shared their thoughts and ideas without reservation.

Information was gathered through semi-structured interviews with teachers. Merriam and Tisdell (2016) cautioned that a researcher who conducts studies within their work or social environment needs to be detached to the point where they can observe and analyze situations without bias. Careful attention was paid to remain neutral and allow the data to inform any conclusions or inferences in this research.

## Rationale and Significance of the Study

This study examined teachers' perceptions about teaching in a 1:1 Chromebook environment. The teachers' beliefs and attitudes about the value of laptops ultimately determine the success or failure of laptop programs (Bebell & Kay, 2010). Much of the literature in this area has focused primarily on student achievement results (Cuban, 2006; Gallagher-Landis, 2017; Glassett & Schrum, 2009; Lowther, Ross & Morrison, 2003; Penuel, 2006), instructional tactics and strategies (Meyer, 2007; Penuel, 2006; Seward & Nguyen, 2019; Stephens, 2017; Tagsold, 2013; Therriault, 2018; Wardley & Mang, 2016), and professional development efforts (Baylor & Ritchie, 2002; Cook, Jones-Bromenshenkel, Huisinga & Mullins, 2017; Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Grundmeyer & Peters, 2016; Liao, Ottenbreit-Leftwich, Karlin, Glazewski, & Brush, 2017; Maninger & Holden, 2009; Tondeur, 2018; Williams, 2017). However, there was a gap in research literature regarding high school teachers' perceptions of their individual experience teaching students in a 1:1 Chromebook environment.  This study could help fill that void and inform educational leaders through authentic feedback from teachers to help shape future efforts to provide crucial resources and support for 1:1 Chromebook use at CHS.

Teachers at Coastal High School may benefit from learning more about the experiences of participants in this study. The participants themselves will have an opportunity to reflect on

their practice and that of their peers. School officials and administrators may gain a better understanding of how they can support teachers from an organizational and institutional perspective, leading to improved teaching and learning.

School leadership is tasked with strategic planning, budgeting, and professional development programming. The researcher is hopeful that this study may reveal ways to provide additional resources to teachers as they work through these areas of responsibility. The teacher's voice must be heard, their feelings validated, and their opinions respected to manage a 1:1 initiative effectively (Cuban, et.al, 2001; Inan & Lowther, 2010).

## Definition of Terms

**Chromebook**. A wireless laptop device that uses Google's web-based Chrome operating system and comes with a free suite of core applications for use by students and teachers (Chromebooks, n.d.).

**Formal professional development**. Participants engage in activities with the expectation to learn a predetermined and specific objective or goal to acquire skills and/or receive in-service credit for certification or recertification (Dabbagh & Kitsantas, 2012).

**Informal professional development**.: Learning that includes informal activities allowing teachers to take charge of the content and the delivery methods of their learning in a variety of formats. Learners gain new knowledge through collaboration, observation, exploration, daily practice, and reflection (Dabbagh & Kitsantas, 2012).

**One-to-one (1:1) initiative**. A one-to-one (1:1) computing model is one in which all the students in a class, grade level, school, or district are provided computers with wireless connectivity for use in school and, in some cases, at home (Zheng, et. al, 2016).

**UTAUT.** The unified theory of acceptance and use of technology (UTAUT) developed by Venkatesh et al. (2003) is a synthesis of eight existing models used to predict the likelihood of successful technology implementation.

## Conclusion

In Coastal High School, there are as many Chromebooks as there are students. It would be logical to assume that this ubiquitous computing environment would lead directly to the widespread adoption and integration of Chromebooks to enhance teaching and learning. However, as Miranda and Russell (2012) note, technology adoption in schools can be a complex and sluggish process. The purpose of this qualitative narrative inquiry study was to explore teachers' lived experiences teaching in the 1:1 Chromebook environment at CHS. The UTAUT framework was used to guide the researcher and frame this study. This narrative inquiry study focused on the data collected through semi-structured interviews with teachers from CHS.

Chapter 2 defines this study's conceptual framework and presents findings from the literature that shaped this study. Themes include 1:1 learning, Chromebook devices, pedagogical change, professional development, teacher attitudes, and Venkatesh et al.'s (2003) unified theory of acceptance and use of technology (UTAUT).

**CHAPTER 2: REVIEW OF THE LITERATURE**

Public high schools in the United States are investing increasingly large amounts of taxpayer money in the promise of digital devices to improve public education. There is evidence that one-to-one (1:1) laptop programs can increase student engagement (Keengwe, et. al, 2012), improve student learning (Keengwe, et al., 2012; Lowther, et. al, 2003), and help graduates to secure employment in our rapidly changing global economy (Islam & Grönlund, 2016). The goal of many school districts is to achieve the coveted 1:1 ratio; a term used to indicate the provision of a school-issued mobile computer for every student (Zheng, et al., 2016). However, many schools have yet to realize the potential of this widespread education reform effort (Cuban, et. al, 2001; Gallagher-Landis, 2017; Lim & Khine, 2006; Lowther et. al, 2003).

Connected devices exponentially expand the resources available to students (Penuel, 2006) and ultimately allow them to define their own unique, self-guided educational experience (Grundmeyer & Peters, 2016). However, in the United States, only 40% of K-12 teachers have said that they have received adequate training on how to use such tools (Vega & Robb, 2019). Furthermore, some research has supported the claim that providing a laptop for every child leads to reduced student outcomes (Cuban, 2006; Gallagher-Landis, 2017; Penuel, 2006).

**Organization of the Chapter**

The purpose of this qualitative narrative inquiry study was to fully explore teachers' lived experiences teaching in the 1:1 Chromebook environment at Coastal High School (pseudonym). This was accomplished through interviews with classroom teachers at CHS with experience teaching in the 1:1 Chromebook environment. This allowed the researcher to gather

rich descriptive stories to understand the teachers' experience as it relates to professional development, technology integration, and student performance in a public high school 1:1 Chromebook environment. This chapter is organized to include background and topics of study connected to the implementation of one-to-one laptop programs, and conceptual and theoretical frameworks.

It has been almost two decades since the first massive one-to-one laptop program was launched in Maine in 2003 with the novel goal of providing every middle school student a laptop (Meyer, 2007). Since that time, Americans have spent considerable funds to provide schools with the technology and infrastructure to support student one-to-one laptop initiatives. The common goal of these programs, as stated in The Office of Educational Technology's national technology plan (U. S. Department of Education, 2014), is to establish equity of access to resources and information for students across all socio-economic levels (Warschauer, Knobel, & Stone, 2004). Many educational leaders believe that laptops are essential to increasing student achievement (Lowther, et. al, 2003) and to preparing them to succeed in an increasingly competitive global workforce (Islam & Grönlund, 2016) upon graduation from high school.

Despite the enthusiasm among educational policymakers at all government levels for this educational reform effort, one-to-one laptop programs in American high schools have not shown any significant boost in student achievement (Cuban, 2006; Gallagher-Landis, 2017; Penuel, 2006). What continues to be the most influential factor in determining the success or failure of any educational reform is the classroom teachers' expertise and motivation (Baylor & Ritchie, 2002; Hsu, 2016; Seward & Nguyen, 2019). The teachers' beliefs and attitudes about

the value of laptops ultimately determine the success or failure of laptop programs (Bebell & Kay, 2010).

Teachers use their professional experience, knowledge, and judgment to choose teaching methods that will be most effective in their classroom environment and have proven successful with their unique student population (Guskey, 2002). Understanding teachers' experience and perceptions is essential for school officials to make informed decisions regarding teacher training and support.

This study will investigate teachers' perceptions of the use of student Chromebooks to support instruction at CHS. The researcher will seek to understand what teachers perceive as valuable professional development experiences and how the 1:1 Chromebook environment has impacted student engagement.

With the introduction of 1:1 student Chromebooks, comes the expectation for a change in pedagogy and methodology. Within a high school 1:1 Chromebook environment, one might expect to see a significant change in pedagogy and methodology throughout the school and across all disciplines. However, the purchase of computers does not lead directly to instructional change (Cuban, et. al, 2001; Lowther, et. al, 2003). Research has shown that teachers require good, quality professional development that provides practical and situational examples (Guskey, 2002; Liao et al., 2017) for the program to be successful.

Educational leaders must understand their teachers' needs and how they can create a transformative environment encouraging innovation and experimentation (Gil, Rodrigo-Moya, & Jesús, 2018). Only then can schools expect to see increased student engagement, higher academic achievement, and a shift towards a more learner-focused method of instruction (Grundmeyer & Peters, 2016). Without a defined purpose and intent for using computers in the

classroom, they can become an unnecessary distraction (Aaron & Lipton, 2018; Tagsold, 2013) for students and a source of frustration for teachers.

The purpose of this qualitative narrative inquiry study is to fully explore teachers' lived experiences teaching in the 1:1 Chromebook environment at CHS. The researcher will address the following topics: one-to-one computer initiatives, Chromebooks in education, pedagogical change, Technological Pedagogical Content Knowledge (TPACK) and Substitution, Augmentation, Modification, and Redefinition (SAMR), professional development connected to Chromebooks, and barriers to technology acceptance.

**One-to-one Computer Initiatives**

A one-to-one (1:1) computing model is one where all the students in a class, grade level, school, or district are provided computers with wireless connectivity for use in school and, in some cases, at home (Zheng, et. al, 2016). When computers are available in only some classrooms, or only for a limited amount of time, the effect on instruction is only marginal (Becker, 2000). In a 1:1 computer model, technology is pervasive, accessible, and equitable.

The first statewide 1:1 wireless laptop initiative in the United States was the Maine Learning with Technology Initiative (MLTI) in 2002 (Zheng, et. al, 2016). This project's expense was justified in large part because people felt that the economic competitiveness of the region could be helped by preparing its students more effectively for the technology-saturated workplace of the future (Penuel, 2006). The wide disparity in socio-economic levels across the state could be mitigated with an equitable distribution of laptops and access to the same digital resources (Warschauer, et. al., 2004).

From 2012 to 2016, the number of mobile computing devices nearly doubled in public schools across the United States (Herold, 2020). Two significant factors have contributed to

this growth. First, the cost of these devices has steadily dropped even as the devices themselves have become more powerful and complex. Second, the Federal Communications Commission's (FCC) Universal Service Program for Schools and Libraries (eRate) has provided high-speed Internet access to virtually all public schools in the United States (FCC, n.d.).

**Chromebooks in Education**

The relatively inexpensive and dependable Chromebook is the most popular 1:1 device in elementary and secondary schools. Chromebook sales made up 60% of educational laptop purchases in 2017, compared to Windows and Mac platforms, which together split the remaining 40% of school purchases (Raphael, 2018). The Chromebook uses Google's web-based Chrome operating system and comes with a free suite of core applications for use by students and teachers (Chromebooks, n.d.) These core applications include, but are not limited to, the following popular programs: (a) Gmail, (b) Google Classroom, (c) Google Drive, and (d) Google Meet.

Schools may also purchase management licenses for their Chromebook devices that allow them to push out additional apps from the Chrome store, secure the devices, manage usability, group users, and track inventory. All of this can be done via a web-based console (Chromebooks, n.d.). In terms of technical support, the operating system is refreshed and updated every time the computer is restarted. These features contribute to a positive user experience and less overhead as compared to other platforms.

**Pedagogical Change**

There is much agreement that laptops are changing instruction (Stephens, 2017). However, there is some debate as to whether 1:1 laptop programs are improving instruction. A

multi-year study of seven large 1:1 programs in Virginia, Maine, Texas, Florida, North Carolina, Michigan, and Pennsylvania revealed a direct link between 1:1 student laptop use in primary and secondary schools and increased student engagement (Argueta, Huff, Tingen & Corn, 2011). However, in that same study, results are mixed on whether and to what degree 1:1 technology influenced student motivation, attendance, discipline, and academic achievement (Argueta et al., 2011). Some studies have documented increased academic performance levels for students with laptops compared to students without laptops (Lowther, et. al, 2003). However, many researchers have been unable to find a definitive link between 1:1 programming and increased test scores (Cuban, 2006; Gallagher-Landis, 2017; Penuel, 2006).

The use of laptops in the classroom are changing instruction in ways that focus more on the student and less on the teacher (Stephens, 2017). Glassett and Schrum (2009) observed students accessing more advanced learning resources, engaging in active inquiry, and teachers taking on the role of facilitator or learning coach. This self-directed, constructivist form of learning can empower students and make them feel more validated in their work (McKnight et al., 2016). Still, it may threaten teachers who think they are ceding control and influence over the curriculum as the presence of student laptops sparks a subtle transfer of power to the learners.

In this new learning landscape of 1:1 laptops, teachers must develop new capacities for facilitation, coaching, consultation, and improvisation (Spires, Wiebe, Young, Hollebrands & Lee, 2009). The traditional role of the teacher has involved imparting knowledge and skills to their pupils. One-to-one computing has introduced more autonomous learning and greater flexibility based on students' interests and abilities. Many students have leveraged the laptops to create new learning opportunities outside the traditional curriculum.

Virtual schools have seen enrollments increase dramatically, like the Virtual Learning Academy Charter School (VLACS) in Exeter, New Hampshire. In 2008, VLACS began with a total enrollment of 700 students, and by the start of the 2018-19 academic year, VLACs was serving over 30,000 active students (VLACS, 2020). Students are becoming increasingly savvy in their use of digital resources and media to learn more about their interests. In 2018, Khan Academy, a free online learning platform providing self-paced tutorials in various subjects, served over 90 million users in 43 different languages, resulting in a staggering 8.7 billion minutes of learning (Khan, 2019). Teachers and educational leaders must question the assumption that they know what is best for every learner (Cook-Sather, 2002).

**Technological Pedagogical Content Knowledge (TPACK) and Substitution, Augmentation, Modification, and Redefinition (SAMR)**

Harris, Mishra and Koehler (2006) suggested that the use of technology in the classroom is dependent upon three essential competencies: technology skills, content knowledge, and curriculum delivery. Effective technology integration cannot occur without mastery of these foundational skills. This triad of skills is foundational to the TPACK model. TPACK illustrates the complex and interconnected knowledge needed to use technology as a learning tool.
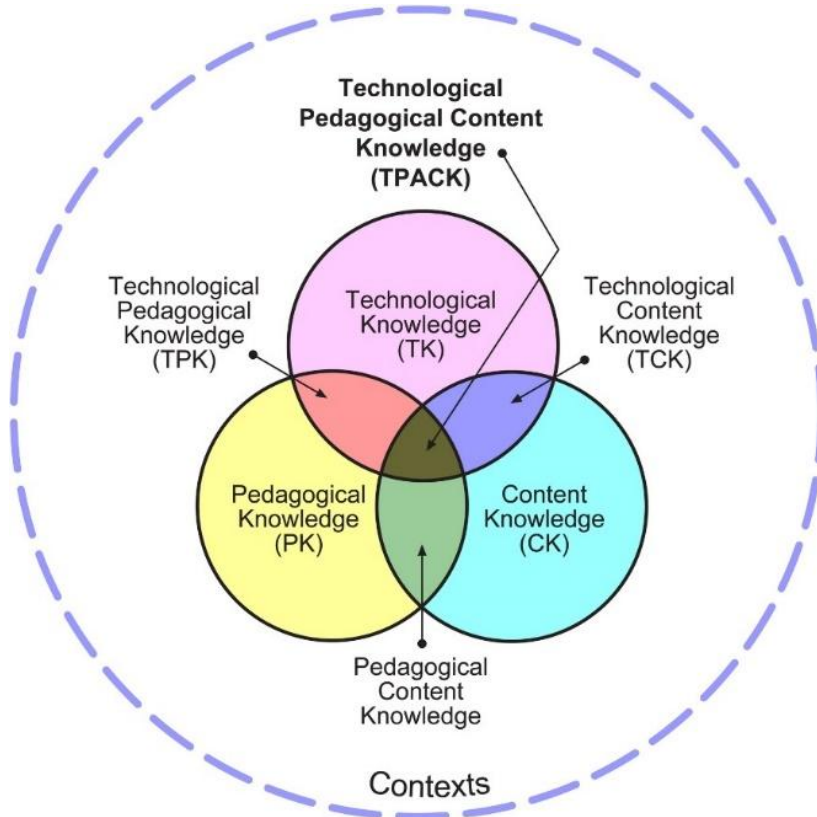
*Figure 2.* The TPACK framework. From "Teachers' Technological Pedagogical Content Knowledge and Learning Activity Types: Curriculum-based Technology Integration Reframed by J. Harris, P. Mishra, & M. Koehler, 2009, *Journal of Research on Technology in Education*, *41*(4), 393–416 (https://doi.org/10.1080/15391523.2009.10782536). Copyright 2009 by Taylor and Francis.

Within the TPACK model (Figure 2), there are three overlapping knowledge areas that can be defined in even more specific terms (Harris, J. et al., 2009). Where technical knowledge (TK) and pedagogical knowledge (PK) overlap a new category of knowledge called *technological pedagogical knowledge* (TPK) develops. Likewise, technical content knowledge (TCK) and pedagogical content knowledge (PCK) are evident. Each of these categories requires the ability and flexibility to synthesize knowledge from two larger domains to select an appropriate instructional approach for a given context (Harris, J. et al., 2009). The context

is dependent on the teacher, grade level, school culture, site specific characteristics and other factors that make every situation unique.

In Figure 2, technological, pedagogical content knowledge (TPACK) are located in the center of the TPACK framework (Harris, J. et al., 2009). This illustrates the heart of the TPACK model, which is the knowledge mastery required to effectively incorporate technology for maximum instructional benefit. It is the combination of the three knowledge domains: technology, pedagogy and content knowledge that results in deep and meaningful technology integration. When designing professional development experiences for teachers it is imperative that technology not be isolated. Instead, it should be presented in such a way that it supports instructional practice and content delivery (Harris & Hofer, 2009) and encourages peer collaboration (Inan & Lowther, 2010) to build trust and community.

Another continuum through which to view technology integration is Puentedura's (2013) SAMR model. In this model, practice moves from a level of enhancement to a level of transformation as the use of technology changes instruction and creates new possibilities for teaching and learning. It is not a progressive model, but rather a way to examine the depth and complexity of technology integration (Hilton, 2016).

The SAMR model represents two broad categories: enhancement and transformation (Puentedura, 2013). Enhancement represents the emergence of technology integration at a minimal level and does little more than engage students through technology to accomplish tasks previously done on paper source. However, transformation represents significant functional change in the classroom and a shift to a more student-centered approach through technology integration (Puentedura, 2013). The base level of SAMR is substitution. At this level students use technology as a substitute for more traditional approaches. At this stage, a

student might be reading a text passage on a laptop rather than from a printed handout. The technology is present, but offers no functional change to instruction (Puentedura, 2013).

Augmentation goes one step further to offer some form of functional improvement to the instructional process (Puentedura, 2013). For example, students might take a quiz using Google Forms and submit it online for immediate feedback on their progress towards mastery. This illustrates a functional improvement through use of technology.

Modification represents the first level of transformation (Puentedura, 2013). This is where students using technology regularly to complete classwork and learning activities can be found. At this stage the technology becomes more transparent as teachers and students become more fluent through regular use. This allows for significant task redesign (Puentedura, 2013). At this level one might see students writing original poetry, recording their voices, choosing background music and publishing audio podcasts for a global audience via the Internet.

The highest level of technology use to facilitate learning is redefinition. At this level, technology has redefined instruction to allow for learning activities that were inconceivable prior to their introduction (Puentedura, 2013). Some examples are student-centered instruction, collaboration with others outside the school community, and exploratory learning based on interest and passion made possible by technological advances.
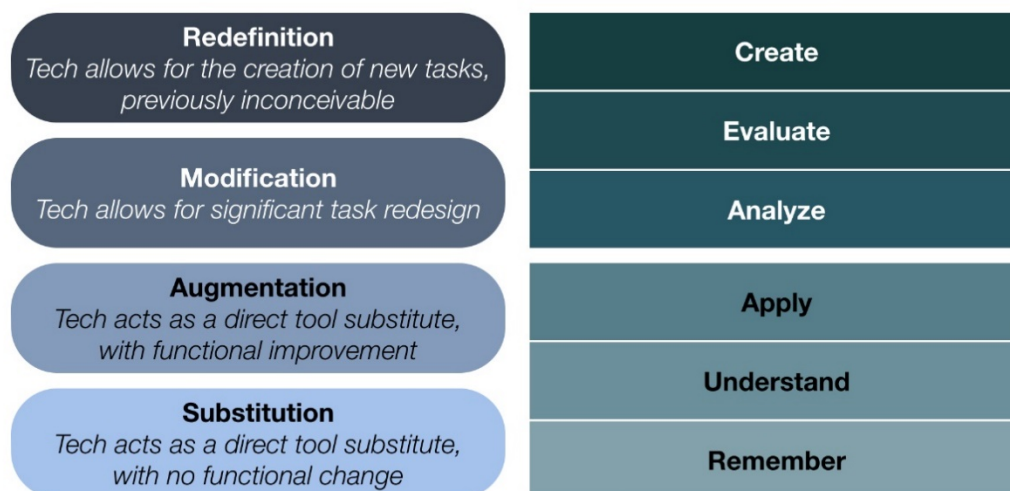
*Figure* 3. SAMR and Bloom's Taxonomy: Assembling the Puzzle (Puentedura, 2020)

The SAMR model developed by Puentedura (2013), has often been compared Bloom's

taxonomy (Bloom, 1956). Anderson et al. (2001) later revised the ladder depicting cognitive

levels. Both models (Figure 3) represent a hierarchy of skills that build successively from the

lowest to the highest levels of learning (Alivi, 2019). Teachers' progress along this continuum

of technology integration can supported through ongoing and targeted professional

development (Ertmer, Ottenbreit-Leftwich, 2010).

**Professional Development Connected to 1:1 Chromebooks**

Research shows that teacher training is the single most important and influential factor

in building a successful 1:1 program (Bialo & Sivin-Kachala, 1996; Bingimlas, 2009). The

teacher's ability to utilize technology can determine whether laptops impede or facilitate

student learning (Cavanaugh, Dawson, & Ritzhaupt 2011). Professional development

programming should be sustained, authentic, pedagogically focused, and situated to the

individual's teaching environment (Liao, et al., 2017). Professional development that is

targeted and immediately applicable is most likely to produce change.

Time must be allotted for teachers to collaborate and explore solutions (Cuban, Kirkpatrick, & Peck, 2001; Inan & Lowther, 2010). The work of transforming one's practice to incorporate new technologies cannot be overstated. The myriad factors involved require careful and thoughtful lesson design based on the teacher's technical skills, content knowledge (Harris & Hofer, 2009), and pedagogical expertise. The credibility and veracity of peer recommendations creates an environment of confidence, trust, and support (Inan & Lowther, 2010) that encourages individual teachers to experiment with new technologies.

Online professional learning opportunities offer teachers a chance to learn from others in their profession. Many informal professional learning networks (PLNs) exist on social media sites like Twitter, Facebook, and Pinterest (Cook, Jones-Bromenshenkel, Huisinga, & Mullins, 2017). By leveraging these online resources, teachers can expand their support network beyond the local school environment. Professional learning networks can provide opportunities for teachers to collaborate, connect, and learn from one another.

Formal online learning programs for teachers continue to gain momentum as well. The convenience of being able to log in and learn without boundaries has created massive opportunities for education. In 2017, 33% of postsecondary students, many of whom are educators, were enrolled in at least one online course (Allen & Seaman, 2017).

**Barriers to Technology Acceptance**

Ertmer (1999) identified two types of barriers preventing the use of technology in the classroom. The first were external factors such as technical support, outdated computer hardware, or slow network connectivity. In the UTAUT framework, the "degree to which an individual believes that the organizational infrastructure exists to support the use of technology" is identified as a facilitating condition (Venkatesh et al., 2003, p. 453). The second

barrier is internal. Teachers who lack confidence, have limited technical knowledge, or see little value in integrating technology will choose not to use it (Keengwe et al., 2012; Penuel, 2006; Sahin, Top, & Delen, 2016).

In 2007, Fullan noted that "Educational change depends on what teachers do and think, it is as simple and complex as that" (p. 129). A good teacher will refuse to employ a new technique or an innovative approach to curriculum delivery until convinced that it will further their growth and improve their effectiveness as a teacher (Kafyulilo, Fisser, & Voogt, 2016). Teacher engagement is crucial to the success of any 1:1 program (Bebell & Kay, 2010).

Many teachers blame 1:1 programming for their increasingly distracted students (Aaron & Lipton, 2018; Tagsold, 2013). Classroom management can become extremely difficult once the students are behind their screens. Teachers' primary way to keep students from becoming distracted is universal; they create and deliver engaging lessons (Tagsold, 2013). This process can take time and patience. The additional professional knowledge and adaptation required for teachers to use technology in significant and innovative ways can take up to five or more years, according to Becker (1994).

## Conceptual Framework

A conceptual framework presents the reader with an argument about why a given research topic is important and why the chosen methods are appropriate, rigorous, and defensible (Ravitch & Riggan, 2017). The following section details the rationale and importance of this study and explain the logic for choosing the unified theory of acceptance and use of technology (UTAUT) as a framework for interpreting data collected through interviews with teachers at Coastal High School.

**Theoretical Framework**

The researcher considered several theoretical models as potential frameworks for this study. However, many of the models, when considered separately, were not adequate in explaining a person's propensity to use a given technology. The unified theory of acceptance and use of technology (UTAUT) is a synthesis of eight existing models used to predict the likelihood of successful technology implementation (Venkatesh et al. 2003). UTAUT was formed through integration and refinement of the following theories: (a) the theory of reasoned action, (b) the technology acceptance model, (c) the motivation model, (d) the theory of planned behavior, (e) the model of PC utilization, (f) the innovation diffusion theory, (g) social cognitive theory, and (h) a combination of the theory of planned behavior and the technology acceptance model (Williams, Rana, & Dwivedi, 2015, p. 444).

The comprehensive UTAUT model allows researchers a more thorough analysis than a single theory that ignores the contributions from alternative models (Venkatesh et al., 2003). The use of the UTAUT model has become increasingly common in the 21st century. In the first 10 years after publication in 2003, the UTAUT model was cited 1267 times (Venkatesh, Thong, & Zu, 2016). UTAUT has been used in research studies involving the adoption of tablet computers by students (Wardley & Mang, 2016), the use of software packages to support teacher professional development (Wan, Cheung, & Chan, 2017), and the adoption of e-Government in developing countries (Gupta, Dasgupta, & Gupta, 2008).

UTAUT has been criticized by researchers for taking a narrow perspective on diffusion and the use of information and communication technology by focusing primarily on the individual adopter (Shachak, Kuziemsky, & Petersen, 2019). Furthermore, the UTAUT model has been criticized for focusing on a specific adoption phase, where program implementation

has already occurred, and users must buy-in (Shachak, et. al, 2019). Program adoption will be explored in this study and further solidifies the rationale for using the UTAUT model.

The UTAUT model consists of the following constructs: (a) performance expectancy, (b) effort expectancy, (c) social influence, and (d) facilitating conditions (Venkatesh et al., 2003). The first three constructs are focused on behavioral intentions, and the fourth is concerned with environmental and organizational factors and the degree to which they facilitate the use of technology. The four constructs presented in the UTAUT are moderated by (a) age, (b) gender, (c) experience, and (d) voluntariness (Venkatesh, et al., 2003). For example, one may find that users' age may influence their perception of effort expectancy in using new technology (Venkatesh, et al., 2003). The research questions in this study of teachers' perceptions of the 1:1 Chromebook program at Coastal High School align well with these four inquiry areas.

Venkatesh et al. (2003) have considered performance expectancy to be "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447). In this researcher's study, RQ 1 is concerned with teachers' perceptions regarding the effectiveness of Chromebooks as an instructional tool. RQ 3 is concerned with the impact on student engagement. A precise alignment exists between improved instructional methodology, improved student outcomes and educators' job performance gains.

Effort expectancy is concerned with the ease of use of the system by participants (Venkatesh et al., 2003). Effort expectancy correlates with RQ 2 and the professional development and preparedness of teachers to integrate Chromebooks. Social influence is concerned with the expectation of others to see the new technology systems being utilized.

This concerns administrative directives, student and parent expectations, and peer collaboration.

The UTAUT framework defines facilitating conditions as the user's perception of how organizational and technical infrastructure exists to support technology use (Venkatesh et al., 2003). This modifying factor influences all the research questions in this study. Data collected on the facilitating conditions of the 1:1 Chromebook program may provide administrators and educational policymakers with crucial feedback on ways to better support teachers from a physical, structural, and managerial perspective.

Administrators and educational policymakers should be able to identify and alleviate existing hurdles to technology integration and offer better teacher support with an understanding of the facilitating conditions that exist within their organization (Storz & Hoffman, as cited by Rutledge, 2019) to support Chromebook integration. Teachers must feel confident using a given technology or they will not be motivated to change their instructional delivery (Hsu, 2016; Sahin, et. al, 2016; Seward & Nguyen, 2019).

## Conclusion

This chapter has introduced some of the significant concepts surrounding 1:1 efforts in American schools and the impact of 1:1 programs on teaching practice. Included is an introduction to 1:1 laptop programs, a description of the Chromebook computer, the need for sustained and relevant professional development for teachers, and the pedagogical shift that occurs when every high school student has their own connected device.

This narrative inquiry study will give voice to the teachers at Coastal High School by sharing their personal stories, feelings and thoughts as educators working in a high school 1:1 Chromebook environment. This study will contribute to a growing body of research on 1:1

computing in high schools. Although the sample size in this study is relatively small, general findings may help inform educators and impact approaches to technology adoption and use in other school communities.

**CHAPTER 3: METHODOLOGY**

One-to-one Chromebook environments exist at many high schools across the United States to provide students with equitable computer access (Grundmeyer, 2016), and to help further their understanding of science, technology, global studies and to develop crucial 21st-century skills such as critical thinking, collaboration, creativity, communication, and information analysis (Wagner, 2008). There is a gap in research on the perceptions of teachers who have experienced this changed instructional environment. The purpose of this qualitative narrative inquiry study was to fully explore teachers' perceptions of their teaching experiences in the 1:1 Chromebook environment at Coastal High School (CHS).

CHS is a pseudonym used by the researcher to conceal the identity of the school. A narrative inquiry method was used to better understand the high school teachers' perceptions through a retelling of their personal experiences. Data were collected primarily through semi-structured interviews with 10 purposefully selected teachers from CHS. Additionally, the researcher reviewed related archival documents such as CHS school board minutes, CHS publications, and media publications about the 1:1 Chromebook program as CHS, all of which helped provide contextual background. Study data were analyzed through a coding process used to uncover themes and descriptions central to this study's research questions.

**Purpose of the Study**

Shafer (2017) suggested that further research is needed to understand what factors or processes should be present to support teachers in a 1:1 environment. Additional research is needed regarding the teacher's perceptions, the facilitating conditions required to integrate 1:1 technology successfully, and its impact on students (Islam & Grönlund, 2016). The purpose of

this qualitative narrative inquiry study is to fully explore teachers' perceptions of their experiences teaching in the 1:1 Chromebook environment at Coastal High School (CHS).

Chapter 3 will describe the narrative inquiry research design applied to this study, the study's setting, and the participants' characteristics. This chapter will also include details of the data collection process and analysis with considerations for possible limitations in this research approach.

## Research Questions & Design

Qualitative research is the systematic collection, organization, and interpretation of textual material derived from talk or conversation (Malterud, 2001, p. 483). With roots in sociology and anthropology and later expanded to the study of phenomena occurring in education, law, and healthcare, qualitative research philosophy assumes that knowledge is socially constructed (Merriam & Tisdale, 2016). This approach aligns well with research on high school teachers' perceptions of their experience teaching in a 1:1 Chromebook environment.

Qualitative research is a form of social inquiry that focuses on the way people interpret and make sense of their experiences and the world in which they live (Holloway, 1997). In qualitative research, "no single, determinable truth exists. Instead, there are truths to be found, and these truths are bound by the time, the context, and the individuals who believe them" (Morrison, Haley, Sheehan, & Taylor, 2002, p. 27). Researchers build meaning through inductive reasoning, where patterns, themes, and regularities (Bernard, 2011) emerge throughout the study to form a shared truth.

The narrative inquiry method of research involves studying a participant's experience as told in story form (Clandinin & Connelly, 2000; Creswell, 2019). Semi-structured interview

questions provide a solid understanding of the participants' experiences as they share their distinctively individual stories (Ollerenshaw & Creswell, 2002). Clandinin and Connelly (2000) refer to these stories as field texts. These deeply personal narratives constitute the raw data for research and provide meaning distilled from rich, emotion-laden stories.

Three research questions guided this study to explore teachers' perceptions of their experiences in a 1:1 Chromebook environment.

**RQ1**: What are the CHS teachers' perceptions of the effectiveness of 1:1 Chromebook environments as an instructional tool?

**RQ2**: What, if any, professional learning and or training has been most effective in changing instructional methodology to include student Chromebooks as perceived by CHS teachers?

**RQ 3**: What impact has the 1:1 use of Chromebooks had on student engagement as perceived by CHS teachers?

Semi-structured, in-depth interviews (Appendix A) were conducted with CHS teachers who met the pre-defined participant eligibility criteria. The sampling method for this study was purposeful. It allowed the researcher to find experienced and knowledgeable participants to address the purpose of this research (Kemper, Stringfield & Teddlie, 2003).

## Site Information and Populations

This study was conducted at Coastal High School (CHS), an award-winning, 4-year, comprehensive public high school in New Hampshire. CHS was named New Hampshire High School of Excellence in 2017 (Tetrault, 2017) and continues to be recognized as a Top 100 High School in the United States (Sullivan, 2018). There were 1,089 students enrolled at CHS in the 2019 school year (NH Public Schools, n. d.).

In the fall of 2015, Coastal High School began a 1:1 Chromebook initiative by purchasing 305 Chromebooks for all incoming ninth-grade students (Albertson-Grove, 2019). The program's goals were to provide students with equitable technology access, to increase technology integration in teaching and learning, and to help students develop the digital literacy skills needed for life after graduation (Islam & Grönlund, 2016). After 4 years of Chromebook distribution to incoming ninth graders and transfer students, all students at Coastal High School began the 2018 school year with a school-issued Chromebook to support their studies.

**Participants**

There are 118 full-time teachers at CHS; 105 hold advanced degrees and 91% are experienced educators with 3 or more years of professional teaching experience (NH Public Schools, n. d.). Invitations to participate in this study were sent by email to all 118 full-time teachers. The first 10 eligible teachers who volunteered to participate were chosen. Any additional survey responses that were received beyond the first 10 were set aside and securely stored in the researcher's Google Drive account. This study's voluntary participants were all full-time classroom teachers from CHS, regardless of the subject or content area they taught. All participants had at least 3 years of concurrent employment at CHS and at least 3 years of experience using Chromebooks to support instruction.

A purposeful sample size of 10 participants was adequate in answering the research questions in this study. When using purposeful sampling, sample size can be determined by the likelihood of reaching data saturation (Suri, 2011). The chosen participants for this study had both the pedagogical expertise and the Chromebook experience required to answer the research questions. All participants were made aware that their participation was voluntary, their

identity would be protected, and all their responses would remain confidential. Furthermore, all participants were reminded that they could stop participating in the study for any reason at any time.

The 10 voluntary participants in this study were vetted based upon three carefully selected criteria:

1. They have been teaching full-time at CHS for at least the last 3 successive school years.

2. They have designed and delivered lessons requiring the use of student Chromebooks for a minimum of 3 years.

3. They have participated in some professional development activities (formal or informal, instructor-led, or peer collaboration) focused on Chromebook technology integration at CHS.

These parameters were used to identify participants who possessed the knowledge and experience necessary to provide rich data and stories regarding teachers' perceptions of the CHS 1:1 Chromebook environment.

**Sampling Method**

Participants for this study were chosen through purposeful sampling. As described by Patton (2002), purposeful sampling is the process of selecting information-rich cases that yield insights and understanding as opposed to random sampling, which offers empirical generalizations. Purposeful sampling is the selection of participants reflecting the average person involved with the phenomenon being studied. (Merriam & Tisdale, 2016). The participants in this study were all CHS teachers who were carefully vetted based upon their experience and involvement with the 1:1 Chromebook initiative at CHS.

**Instrumentation & Data Collection Procedure**

Following Institutional Review Board (IRB) approval, permission to conduct this study was received from the assistant superintendent of schools responsible for Coastal High School through documented email correspondence. After approval from and coordination with the CHS principal, a recruitment email was sent to all CHS teachers via their work email addresses inviting them to volunteer for this study. This initial email explained the study's purpose, participation requirements, methods used for data collection, information regarding confidentiality protocols, a consent form (Appendix B), an explanation of any associated risk or benefit to the participants, and a link to the study's participant recruitment survey (Appendix C) on REDCap.

Interested teachers were asked to fill out a participant recruitment survey on REDCap where all eligibility criteria to participate in the study was housed. Ineligible participants were filtered out automatically by the REDCap software and never reached the final confirmation screen based on their survey responses. Only eligible participants were asked to enter their personal email address and to click a button indicating their willingness to participate in the interview process. Participant eligibility was then transmitted to the researcher, along with the potential participant's personal email address for any further communication. At no time did the CHS principal, or any other district personnel, know which teachers responded or participated in this study.

**Interviews**

Interviews were conducted virtually using Zoom web conferencing software which allowed participants to choose their preferred location for the interview. Elwood and Martin (2000) suggested that participants feel more empowered if they choose the setting for their

interviews with the researcher. Participants were instructed to choose a physical location with privacy and minimal chance for disruption.

An informed consent notice for the REDCap survey (Appendix C) was sent as an attachment to the initial recruitment email. The informed consent form included the name of the researcher, the criteria for participation in the study, the purpose of the study, the time commitment for participants, potential risks or benefits to the participants, the confidentiality of personally identifiable information, the protocol for interviews and follow-up sessions, and the researcher's personal contact information. The participants were also informed of their right to withdraw from the study at any point in the process (Creswell & Poth, 2018).

Before beginning each scheduled interview, the researcher confirmed that each participant had returned a completed informed consent form for the interview (Appendix D), understood the information therein, and that their copy of the original form had been received. The interview process, the purpose of the study, and identification of the recording device used to capture the interview question responses were discussed. Participants were told that the researcher would be taking field notes (Creswell, 2019) throughout the interview.

Participants' interviews were recorded via Zoom and their responses were transcribed using Otter.ai software. The transcription text was then uploaded to the researcher's personal GSuite account. All interview data have been carefully secured and kept away from public view (Bloomberg & Volpe, 2016). The researcher reviewed each transcript for accuracy and then shared it with the participant for verification (Stake, 1995). This process is referred to as member checking (Lincoln & Guba, 1985). Member checking can reduce errors made during transcription and give participants a chance to clarify anything they thought misrepresented

their voice. It is a "way of finding out whether the data analysis is congruent with the participants' experiences" (Curtin & Fossey, 2007, p. 92).

Once the participants validated their interview transcript responses, the researcher began the coding process. Saldaña (2013) described a code as a shorthand designation to illustrate facets of data based on qualities or characteristics determined by the researcher. The researcher followed Creswell's (2019) five steps:

1. Read through the text data

2. Divide the text into segments of information

3. Label each segment of information with a code

4. Reduce redundancy and combine codes where appropriate

5. Collapse the codes into themes

Completed transcripts were uploaded to NVivo, a web-based platform used by qualitative researchers to identify themes and to categorize participant responses. NVivo software was used to identify, to analyze, and to quantify similarities, trends, and emerging themes from the transcript. The researcher identified phrases within the interview transcripts representing frequently used words, specific ideas or meanings, and assigned them codes (Bloomberg & Volpe, 2016). In the beginning, this process was very fluent and flexible to allow for the varied responses (Creswell, 2019) from all 10 participants. As the coding process continued, this process was refined by combining and collapsing similar codes into emergent themes. In a separate NVivo file, the researcher also filtered participant responses to the semi-structured interview questions based on the four constructs of the UTAUT framework.

**Archival Data**

Archival data such as newspaper articles, school board minutes, and district publications were used to provide additional background and context about the CHS 1:1 Chromebook program. Strøm and Fagermoen (2012) believe that interweaving the data clarifies the similarities and differences between sources, thereby lending credibility and transparency to data analysis and confirming researcher insights (Bloomberg & Volpe, 2016). Multiple data sources provided reliability in the form of triangulation. Triangulation is the process of validating qualitative data by comparing the results from various data collection sources (Oliver-Hoyo, & Allen, 2006) to form a complete picture of the research topic (Farmer, Robinson, Elliott & Eyles, 2006).

To protect the study's authenticity and the confidentiality of the participants, all related notes, calendars, transcripts, consent forms, field notes, early drafts, and other related materials have been digitally secured and stored in the researcher's Google Drive account. These files will not be deleted for at least 4 years after publication, or as determined by the IRB.

**Field Test**

When developing an interview protocol, a researcher must test and refine the questions (Yin, 2014). A trial-and-error process was used to perfect the wording and order of items in the semi-structured interview, as suggested by Morse (1991). The researcher conducted field tests with two teachers from CHS who met the participant qualifications for this study to determine the efficacy of the interview script, but they did not participate in this study. All data collected from the field test were discarded after review.

This field test allowed the researcher to evaluate the interview script and ensure proper word choice to establish authenticity (IRB Corner, 2015). The open-ended questions were

designed to elicit full answers and rich, detailed accounts of participants' experiences without undue influence by the researcher (Creswell, 2019). Field test participants were informed of the study's purpose, made aware of the researcher's intent, and encouraged to provide feedback on the experience and the effectiveness of the interview questions' content and ordering.

## Limitations of the Research Design

Connolly and Clandinin (1990) believed that "education is the construction and reconstruction of personal and social stories; teachers and learners are storytellers and characters in their own and other's stories" (p. 2). Therefore, the narrative inquiry method of research is often used in educational studies concerned with teachers' perceptions. Narrative inquiry is concerned with human experience. The memories, feelings, and recollections of participants' experiences are subject to continuous change and transformation (Clandinin & Connelly, 2000).

Participant reactivity (Pattison & Shagott, 2015) is a potential limitation in this study. The researcher is the technology director at the school. Although the researcher's relationship with study participants is collegial and trusting, he is a coworker. To prevent participant reactivity, the researcher has been transparent and forthcoming with the participants about the research goals, data collection process, and the importance of member checking (Lincoln & Guba, 1985). Participants have been encouraged to provide honest, candid responses. The researcher will address credibility, member-checking procedures, transferability, dependability, and confirmability in the data collection and analysis processes in the following sections.

### Credibility

A researcher must accurately reflect the study participants' thoughts, feelings, and actions (Bloomberg & Volpe, 2016). A researcher can establish credibility through careful

attention to researcher bias, full consideration of all data collected, and general knowledge of the research topic. The researcher in this study is a former teacher and an experienced educational technology consultant. He is currently the Director of Information Technology at Coastal High School.

The researcher's proximity and experience working with the participants in this study can be advantageous. However, it can also introduce a level of bias or preconceptions. Through careful observation, field notes, and self-monitoring for consistent objectivity, the researcher has taken proactive steps to maintain this study's credibility. Archival documents such as school board minutes and newspaper articles have helped the researcher triangulate the data by using multiple corroborative data sources.

**Member Checking Procedures**

Researcher bias has been further mitigated by the participants' involvement in checking and verifying their interview transcripts. This method is known as member checking or participant validation (Birt et al., 2016). This practice allowed participants to clarify their meaning and avoid misinterpretation by the researcher.

**Transferability**

Transferability is referred to as the external validity of a study (Merriam & Tisdale, 2016). In other words, it is the degree to which this study's findings be generalized to apply to other similar situations. Ten participants have provided sufficient data (Suri, 2011) to fully explore teachers' perceptions of their experiences in the CHS 1:1 Chromebook environment. However, this study's findings cannot be generalized to represent the experience of teachers in all schools. Transferability is limited because every school has a distinct culture, a unique population of teachers and students, and other circumstances and factors beyond this study's

scope. Nevertheless, this study may lend insight into high school teachers' general perceptions of teaching and learning in a 1:1 Chromebook environment.

## Dependability

A study's dependability can be determined by the level of transparency and information documenting the process and procedures used to collect and interpret the data (Bloomberg & Volpe, 2016). The detailed descriptions of the research methodology employed in this study and the transparency concerning this study's perceived limitations should give a reader confidence that this study is dependable, ethical, and credible.

## Confirmability

Confirmability occurs when "credibility, transferability, and dependability have been established" (Thomas & Magilvy, p. 152, 2011.).  The researcher's interpretations of participants' stories must be accurate, and the study's conclusions must be connected to the research data and not influenced by the researcher's own bias (Creswell, 2019). To encourage participants to express their thoughts freely, honestly, and without reservation, the researcher has reminded them of the agreement to de-identify them and their site, and keep their information confidential, both verbally and in writing, throughout the data collection process.

## Ethical Issues and Conflict of Interest

Researchers are morally bound to conduct their studies in ways that will minimize any potential harm to participants (Bloomberg & Volpe, 2016). Researchers should establish procedural safeguards and be explicit in detailing the rights of participants (Roberts, 2010). Informed consent is the centerpiece of research ethics.  All human participants must be made aware of the potential risks and benefits of participating in a research study so that they may judge for themselves if they want to participate (Bloomberg & Volpe, 2016).

**Ethical Issues**

To protect the identity of the research site, the researcher chose to use a pseudonym. Furthermore, any participants in this study will remain de-identified. All related notes, calendars, interviews, correspondence, early drafts, and other related materials have been safeguarded and stored in the researcher's password-protected Google Drive account with 2-factor authentication to ensure an extra layer of security.

Participants were reminded in the recruitment email and before interviews that participation in this study was voluntary, and that they had the right to withdraw at any time without penalty. Anything recorded or said during the interview process cannot be associated with individual participants. All interview transcription files have been stored in the researcher's secure Google Drive folder, and the file names contain no personally identifiable information. For example, two individual participant interviews recorded on December 1, 2020, might look like this: 120120-08 or 120120-01.

**Conflict of Interest**

The researcher can intentionally or unintentionally influence a study's outcome with their subjectivity (Bloomberg & Volpe, 2016). The researcher in this study is employed at the same school as the participants and sought to keep his own potential bias from influencing the study. To reduce the potential of discrimination or prejudice against participants, the researcher has removed any identifying information from the transcripts and conducted a blind analysis (Kolbe & Burnett, 1991) of each participant's stories. The researcher has used only the data collected in this study and has been careful not to project his own experience or beliefs.

**Conclusion and Summary**

A detailed description of this study's methodology was provided in this chapter. Narrative inquiry methodology was employed to understand better teachers' perceptions of their experiences in a 1:1 Chromebook environment at CHS. Analysis of participants' detailed narratives during the semi-structured interviews has revealed emerging themes related to this study's research questions. The researcher has taken all necessary precautions to conduct this human participant study in an ethical manner that protects the research site and participants' identity, safeguards any collected data, and informs participants of their rights. The researcher has diligently addressed the credibility, transferability, dependability, and confirmability throughout the data collection and analysis process.

**CHAPTER 4: RESULTS**

The purpose of this qualitative narrative inquiry study was to fully explore teachers' perceptions of their lived experiences teaching in the 1:1 Chromebook environment at Coastal High School (CHS). Data were collected from analyzing high school teacher's experiences, observations, and beliefs about teaching in a 1:1 Chromebook environment. UTAUT (Venkatesh et al. 2003) supported the researcher's analysis of technology adoption and provided a framework for interpretation of the collected data.

The methods utilized to organize and to analyze the collected data are presented in this chapter. Interview transcripts were coded into categories to extract emergent themes. Participants' responses are presented verbatim for accuracy. Pseudonyms have been used to protect participant identities.

### Research Questions

The following research questions were used to guide this study to explore teachers' perceptions of their experiences in the 1:1 Chromebook environment at Coastal High School:

**RQ1**: What are the CHS teachers' perceptions of the effectiveness of 1:1 Chromebook environments as an instructional tool?

**RQ2**: What, if any, professional learning and/or training has been most effective in changing instructional methodology to include student Chromebooks as perceived by CHS teachers?

**RQ 3**: What impact has the 1:1 use of Chromebooks had on student engagement as perceived by CHS teachers?

**Participants and Site**

This study's site was Coastal High School (CHS), a large school that serves five seacoast communities in New Hampshire. CHS serves approximately 1,200 students and employs 118 full-time classroom teachers (NH Public Schools, n. d.). The 1:1 Chromebook program at CHS began in 2015 with the incoming freshman class. Since 2018, every student in grades 9-12 had been issued a Chromebook for supporting their education.

The researcher planned to conduct this study with 10 participants. However, only nine respondents who met the study criteria agreed to participate, even after the timeline was extended an additional 3 weeks. And, despite the best efforts of the researcher to remain flexible, one participant declined to be interviewed due to time conflicts, leaving the researcher with eight eligible study participants.

Participants for this study consisted of CHS teachers who met the eligibility criteria of:

1. Taught 3 or more successive years at CHS.

2. Participated in some type of professional development activities centered around the use of Chromebooks to support instruction within the last 3 years.

3. Designed and delivered lessons incorporating the use of student Chromebooks within the last 3 years.

All participants signed an informed consent document (Appendix D) regarding their rights as participants and the measures taken to protect their identity from discovery. This document covers the potential risks associated with participation in this study as well as the benefits. A careful explanation regarding participant confidentiality and the security of related documents and files was provided as assurance that no personal information would be included in the study.

Among the participants were two language arts teachers, two social studies teachers, two science teachers, one math teacher, and one special education teacher (Table 1). All participants are referred to in this study using pseudonyms to protect their identity. All participants in this study are experienced educators who have participated in professional development activities at CHS and currently use 1:1 Chromebooks to support their instruction.

Table 1.  *Study Participants*

| Participant | Years at CHS | Professional Development | Chromebooks | Department |
|---|---|---|---|---|
| Boyd | 16 | Yes | Yes | Special Education |
| Chambers | 12 | Yes | Yes | English |
| Clavin | 21 | Yes | Yes | Science |
| Howe | 9 | Yes | Yes | Social Studies |
| Malone | 8 | Yes | Yes | English |
| Peterson | 31 | Yes | Yes | Social Studies |
| Sternin | 23 | Yes | Yes | Science |
| Tortelli | 21 | Yes | Yes | Math |

**Analysis Method**

The researcher chose to conduct a narrative inquiry study to gain a deeper understanding of teachers' lived experiences teaching in the 1:1 Chromebook environment at CHS. Qualitative research focuses on the way people interpret and make sense of their experiences (Holloway, 1997). Qualitative researchers build meaning through inductive reasoning, where patterns, themes, and regularities (Bernard, 2011) emerge from analysis of participants' experience as revealed in their personal narratives (Clandinin & Connelly, 2000; Creswell, 2019). For this study, data were collected for analysis through a participant recruitment survey and participant interviews.

**Recruitment Survey**

After coordinating with the high school principal, the researcher sent a recruitment email to the school email accounts of all teachers at CHS inviting them to participate in this study. The recruitment email explained the purpose of the study, outlined the necessary criteria for participation in the study and provided assurance that participation was both voluntary and confidential. Within that email was a link to the researcher's recruitment survey hosted by REDCap, and a consent form for participation in the recruitment survey (Appendix B) was included as an attachment.

The recruitment survey was used to verify that interested participants met the necessary eligibility criteria for participation in the study. After completing the recruitment survey, eligible participants were asked to indicate their desire to participate in the study by providing their personal email address to the researcher for further contact. Participants entered their personal email addresses in the REDCap survey. After an open recruitment period of 3 weeks, the researcher downloaded the list of nine eligible participants and their personal email addresses from REDCap.

Twelve teachers responded to the recruitment survey; however, only nine respondents met the predefined participant eligibility criteria. The researcher extended the recruitment period an additional 3 weeks looking for one more qualified participant. However, there were no new applicants. During the same period, one of the original nine qualified participants dropped out for personal reasons. The eight remaining qualified participants were then contacted by the researcher via their personal email address thanking them for their willingness to participate in the interview process and directing them to complete and return an attached interview consent form (Appendix D).

**Interviews**

  The researcher arranged a time to conduct Zoom interviews with the participants and communicated with them using the personal email address provided during the REDCap recruitment survey. Prior to the interview, a reminder email was sent to each participant. An attached interview consent document was also included, and participants were asked to complete and return to the form to the researcher prior to the interview.

  The Zoom interviews were conducted from the researcher's home office away from public view. Participants selected locations where they felt comfortable conversing online for 30 minutes that were also free of interruption for the interview. For some participants this was either at their residences or in their offices.

  The semi-structured interviews followed a prepared script (Appendix A) to ensure the integrity of the data and to eliminate any potential bias or influence that might arise from rewording the questions or asking new ones. The researcher deviated from the scripted questions only to clarify participants' responses. The open-ended questions were created to elicit rich and descriptive answers from the participants to answer the research questions and explore the four constructs of the UTAUT (Venkatesh et al., 2003).

  Before beginning each interview, participants were again reminded that participation was voluntary, their identity would be protected, and that the interview was being recorded directly onto the researcher's laptop. After each interview was completed, the researcher immediately uploaded the audio file to Otter.ai for automated transcription. After the file was transcribed to text, it was then downloaded to the researcher's secure cloud storage on Google Drive. The original Zoom audio file was removed from the researcher's computer and uploaded to the researcher's secure Google Drive. Next, the researcher deleted the

transcriptions from the Otter.ai platform. By following this series of steps, the researcher

ensured that all files were secure and away from public access.

In accordance with the member checking (Lincoln & Guba, 1985) procedure, interview

transcripts were emailed to each individual participant's personal account for their review.

Participants were encouraged to make any corrections or identify any mistakes in the

transcripts. None of the participants requested any edits or corrections, even after being given 2

weeks to review the transcriptions. Each transcription file was uploaded to NVivo, a secure

qualitative data analysis program used by qualitative researchers to code transcripts and

identify emerging themes.

Specific to this study's analysis methods, the researcher analyzed the eight participants'

interview responses that resulted in the discovery of seven emergent themes. This was

accomplished applying Creswell's (2019) methodology for coding and identifying themes in

qualitative data.  All seven emergent themes are discussed and presented along with tables

representing the multiple iterations of the coding process.

**Coding Process**

Bloomberg and Volpe (2016) described coding as the first step for a researcher in

*rethinking* the data collected. In the first iteration of data analysis, the researcher carefully read

through the transcripts multiple times making notes and creating codes for participant

responses that shared a common meaning, seemed significant, or related to one of the four

UTAUT (Venkatesh et al., 2003) constructs that provided the theoretical framework for this

study.

All transcripts were hand coded by the researcher and organized using NVivo software. This allowed the researcher to tag, to rearrange, and to categorize coded text segments or phrases easily and accurately and to combine like codes in the second iteration of data analysis.

The researcher followed Creswell's (2019) steps for coding and identifying emerging themes:

1. Read through the text data and record initial impressions and ideas.

2. Analyze each piece of text and begin to identify and organize text segments by code.

3. Make a list of code words and create groups of like codes.

4. Reduce redundancy and combine codes where appropriate.

5. Collapse the codes into emergent themes.

The researcher went through multiple iterations of data analysis. Steps were often repeated, revisited, and revised before emergent themes concerning teachers' lived experiences teaching in the 1:1 Chromebook environment at CHS (Tables 1-7) were identified as part of the third iteration of data analysis.

**Emergent Themes**

The researcher's coding of participant interview responses resulted in the following emergent themes: (a) the instructional effectiveness of Chromebooks, (b) teachers' preferred methods of professional learning, (c) student engagement, (d) performance expectancy, (e) effort expectancy, (f) social influence, and (g) facilitating conditions. Text segment coding and the combined codes are presented for each emergent theme to provide a full overview of the coding process from iteration one through three. Combined codes came from the grouping of similar codes to eliminate redundancy (Creswell, 2019). Text segment coding is a process

where the researcher creates *in vivo* codes (Creswell, 2019), based on the language of

participants, to identify one or more concepts to each individually coded text segment.

**Instructional effectiveness**. Instructional effectiveness (Table 2) is defined as the

perceived value, efficiency and worth of using 1:1 Chromebooks to support teaching and

learning. Participant responses indicated that the CHS 1:1 Chromebook environment created

equitable access to academic resources both in and out of school for students and created

efficiencies for instruction.

Table 2. *Emergent Theme: Instructional Effectiveness*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| Instructional Effectiveness<br>• Useful in Pandemic<br>• Equitable<br>• Digital resources are static<br>• Students can redo work<br>• Efficiency<br>• Videos for reinforcement Virtual lab experiments<br>• Remote learning<br>• Access to curriculum<br>• Research<br>• Presentations<br>• Collaboration<br>• Homework<br>• Project-based teaching<br>• Expedites handwritten work | Instructional Effectiveness<br><br>a. Chromebooks improve efficiency of instruction,<br><br>b. The CHS 1:1 Chromebook program allows for equitable access for all students, and<br><br>c. There has been a shift to more project-based learning due to the availability of 1:1 Chromebooks in the classroom<br><br>d. 1:1 Chromebook access allows for easier remote learning and access to school resources outside of the normal school day | Instructional Effectiveness<br><br>The CHS 1:1 Chromebook environment creates equitable access to academic resources both in and out of school for students and creates efficiencies for instruction. |

**Professional learning.** A second emergent theme was professional learning (Table 3)

or professional development. Professional development for teachers is a learning process made

up of both informal and formal activities to further their abilities and knowledge as

professional educators (Kyndt, Gijbels, Grosemans & Donche, 2016). The majority of

participants in this study expressed that the most successful professional development consisted of self-guided learning activities and peer collaboration.

Table 3. *Emergent Theme: Professional Learning*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| • Hodgepodge<br>• Futzing around<br>• Neighbors<br>• IT Department<br>• Watching others<br>• Trial and error<br>• School PD<br>• Common planning<br>• Time challenges<br>• Collaboration<br>• Co-workers<br>• Tutorials<br>• YouTube<br>• Wife<br>• Tech Integration specialist<br>• Observing others<br>• Outside conferences<br>• Experimentation<br>• Research at home | a. All participants reported Self-Guided Learning<br><br>b. Most participants reported active Peer Collaboration<br><br>c. Most participants attended organized PD offerings at CHS<br><br>d. Some participants sought help from the school's IT Department<br><br>e. Some participants attended outside conferences | Successful professional development incorporates a blend of self-guided learning and experimentation supported by peer collaboration and supplemented by organized PD classes at school. |

**Student engagement.** A third emergent theme was student engagement (Table 4). Student engagement is an evolving construct that captures a wide range of institutional practices and student behaviors related to student satisfaction, academic achievement, time on task, social interactions, academic integration, and teaching methodology (Kahu, 2013). Participant responses indicated that the CHS 1:1 Chromebook environment has resulted in less in-person communication and conversation while simultaneously increasing digital collaboration.

Table 4. *Emergent Theme: Student Engagement*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| <ul><li>Additional tools</li><li>Absence doesn't prevent work from being done</li><li>Tunnel-vision</li><li>Less conversation</li><li>Typing notes</li><li>Photos of notes</li><li>Contrary to brain-based</li><li>Too much screen time</li><li>Lack of listening</li><li>Lack of conversation</li><li>Less communication</li><li>Efficiency</li><li>Device engages them</li><li>Security blanket</li><li>Collaboration</li><li>Correcting is easier</li><li>Pizzazz</li></ul> | (a) The use of Chromebooks in the classroom limits productive conversations between students and teachers.<br><br>(b) The use of Chromebooks can increase student collaboration and help engage students that are typically shy. | The CHS 1:1 Chromebook environment has resulted in less classroom communication and conversations between students and participants while simultaneously increasing digital collaboration between students and encouraging reluctant students to communicate freely in a digital forum. |

**Performance expectancy.** A fourth emergent theme was performance expectancy (Table 5). Venkatesh et al. (2003) considered performance expectancy to be "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447). Participants indicated that the CHS 1:1 Chromebook environment created equitable access to academic resources both in and out of school for students, increased the efficiency for instructors, and encouraged more student-centered learning.

Table 5. *Emergent Theme: Performance Expectancy*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| <ul><li>Create quizzes</li><li>Self-grading</li><li>Reuse lessons</li><li>Students can redo work</li><li>Flipping the classroom</li><li>Less need for the teacher</li><li>Technology is an advantage</li><li>Ability to quickly share</li><li>Access to the Internet</li><li>Kids in the driver's seat</li><li>Eliminates paper and waste</li><li>Simulations</li><li>Access to online resources</li><li>Level playing field</li><li>Device at home</li></ul> | (a) Participants expect that using 1:1 Chromebooks will increase classroom efficiency.<br><br>(b) The use of student Chromebooks allows for more student autonomy and control.<br><br>(c) The CHS 1:1 Chromebook program levels the playing field for all learners. | The CHS 1:1 Chromebook environment creates equitable access to academic resources both in and out of school for students, creates efficiencies for instruction and encourages more student-centered learning. |

**Effort expectancy.** A fifth emergent theme was effort expectancy (Table 6). Effort expectancy is concerned with the ease of use of the system by participants (Venkatesh et al., 2003). Participants reported that the amount of time needed for them to learn and to incorporate new digital resources is the greatest barrier to realizing the full potential of the 1:1 Chromebook program at CHS. However, some participants noted that once a participant mastered a program and created the initial curricular content, that content can be reused easily when appropriate.

Table 6. *Emergent Theme: Effort Expectancy*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| <ul><li>Finding time is a challenge</li><li>Initial content creation</li><li>Things just don't work</li><li>I'm full, I can't</li><li>I realized how easy it was</li><li>Faster and easier</li><li>Fear of troubleshooting t</li><li>Problem-solving is the norm</li><li>Easy to access resources</li></ul> | a) Time is the greatest barrier to participants using 1:1 Chromebooks to their full potential.<br><br>(b) Participants find that the initial effort to use a new digital resource is the most arduous, but once materials and methods are created it makes lesson delivery easier.<br><br>(c) There is anxiety around the need to troubleshoot technology issues in front of students. | The time needed for participants to learn and incorporate new digital resources is the greatest barrier to realizing the full potential of the 1:1 Chromebook program at CHS. However, once a participant masters a program and creates initial content, it increases their efficiency as resources can be reused when appropriate. |

**Social influence.** A sixth emergent theme was social influence (Table 7). Social influence is concerned with the expectation of others to see the new technology systems being utilized (Venkatesh et al., 2003). Participants stated they appreciated the freedom to use technology as they deemed appropriate without pressure from the administration to do so. Many participants expressed their desire to collaborate with their peers more regularly.

Table 7. *Emergent Theme: Social Influence*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| <ul><li>Colleagues working smarter</li><li>A more universal experience</li><li>There was no pressure</li><li>You just took advantage of it Too much screen time</li><li>Lunch with my peers Encouraged other teachers</li><li>All use Google Classroom.</li><li>This is an investment</li><li>Pressure to be available more</li></ul> | (a) Participants feel that they are given the freedom to use technology at their own discretion without pressure from school administrators.<br><br>(b) Colleagues sometimes encourage each other to collaborate or improve instruction using digital tools.<br><br>(c) Some participants expressed the desire to see a more universal approach to Chromebook use. | Participants appreciate their freedom to use technology as they see fit. However, many participants wish for increased levels of peer collaboration around Chromebook use to support instruction. |

**Facilitating conditions.** A final emergent theme was facilitating conditions (Table 8). In the UTAUT framework, the "degree to which an individual believes that the organizational infrastructure exists to support the use of technology" is identified as facilitating conditions (Venkatesh et al., 2003, p. 453). Participants shared they thought that they were well supported by persons in the district's the information technology department. According to participant responses, the most significant hurdle to using 1:1 Chromebooks at school was keeping the devices charged.

Table 8. *Emergent Theme: Facilitating Conditions*

| First Iteration: Repeated Codes/Initial Codes | Second Iteration: Categories/Patterns | Third Iteration: Emergent Theme |
|---|---|---|
| <ul><li>I think the support is there</li><li>We always have somebody</li><li>I always felt supported</li><li>Different Chromebooks</li><li>Time</li><li>I can experiment</li><li>Connectivity is an issue</li><li>Creative freedom</li><li>Kids won't charge them</li><li>Forgot my Chromebook</li><li>Broken screens</li><li>Not enough support staff</li><li>Not charged</li><li>Student skills</li></ul> | (a) Participants reported good technical support for the school IT department.<br><br>(b) Time to learn new skills continues to be the greatest barrier to 1:1 Chromebook utilization by participants.<br><br>(c) Charging the Chromebooks has proven to be one of the biggest barriers to full 1:1 implementation. | Participants feel that they are well supported by the Information technology department. Most participants feel that the most significant hurdle to using 1:1 Chromebooks at school is keeping the devices charged. |

## Presentation of Results

Verbatim participant responses to eight interview questions and summarized answers to support the emergent themes are presented in this section. Pseudonyms have been used to protect the identities of the participants. These results are presented in the order that the interview questions were asked.

### Interview Question Results

All study participants were asked the same eight open-ended questions. These questions were purposefully designed to explore teachers' lived experiences teaching in the 1:1 Chromebook environment at CHS. The researcher constructed interview questions to correlate with the study's research questions and theoretical framework.

**Interview question one.** Participant responses to interview question one, "Could you please tell me your own story of using Chromebooks to support instruction at CHS?" are presented in this section. In response to question one, Clavin commented on the convenience and efficiency of using online resources,

> So, with respect to instruction, I find Chromebooks can be useful. Especially in the current environment, where the students are not in front of us. I think one of the most important things is that they allow us to reproduce the same material for multiple classes, which is not the case when the kids are live [as opposed to the remote online instruction].

Chambers mentioned that student Chromebooks were not appreciated by all students when the program first began,

> There was the initial foot stamping from students that you know, this isn't fair that we've got this group of kids that has a [Chromebook] device that they get to carry around with them all day, you know, parents kind of grumbling about that, too.

Malone mentioned that equity has always been a goal of the 1:1 Chromebook program at CHS,

> I was here when we switched over. It's something I've always been excited about. I think, for me, one of the reasons I became a public educator is, and this sounds a little cheesy, but the democratic ideal. You know? That everyone deserves access to these opportunities. Everyone deserves access to the best education that we can provide them.

Tortelli shared she used the Chromebooks as a reinforcement tool in her math classes. She mentioned her thought process as she began to consider integrating Chromebooks for the first time,

Well, maybe if I use like some games with the Chromebooks, maybe that'll really help.

And so, I remember I tried it that year. And it was really good for some of the kids

because it just gave them something new and different. And it was "if you're done an

understanding, you can go to the site", and we did like splash math and just these stupid

little things. But it was just practicing like, oh, one-fourth plus one-fourth is a half and

some of the kids, I think, really appreciated that practice.

Boyd expressed she had reservations about using the Chromebooks from the beginning.

She stated,

So when it was decided to do a one-to-one, and the decision was made to acquire

Chromebooks, I personally was not thrilled. My preference would have been to have

students have a MacBook, not even an iPad, but a small MacBook. And then when it

was decided that it [a Chromebook] was less expensive, and I understood that. I had

really hoped that we were going to do small laptops, because I felt like a Chromebook

was, and still is, fairly limited in what students can really do [compared to] working

with a regular [non-Chrome OS] laptop.

**Interview question two.** Participant responses to interview question two, "How have

you acquired the skills necessary to integrate Chromebooks in your curriculum effectively?"

are presented in this section. Three broad categories emerged per participant responses, (a)

independent research, (b) peer collaboration, and (c) workshops or formal training.

***Independent research.*** Participants identified many different experiences and types of

professional learning, but the method mentioned by all participants was the need for

independent research or exploratory learning. Peterson, as he was shaking his head, said, "Boy,

it was just a lot of trial and error. Just like, what's working. And I did a lot of YouTube

videos." Clavin commented, "It's not my favorite way of doing it, but futzing around." Boyd explained the need for experimentation saying,

> If you want us to get better at something, then you gotta let us learn to play and explore. I got permission to take mine [laptop] home for the summer. And I used it for other things. And as a result, I came back in the fall steps ahead of other people. I would look it up on the Internet, and then, Oh! That's how you do it.

Chambers pointed out that self-directed learning required a significant amount of time on the part of the teacher,

> It's a lot of trial and error, you know? [paused] And some of this is on my own time, right? Things that I do on my own. Finding the time, that has been universally, I think, the largest challenge. Because I want to [learn new skills], but unfortunately, as educators, sometimes it's easier to stay our current path so that we can continue to provide the best for our students… I wish we had more time, that gift of time, to devote to such things.

***Collaboration with peers.*** Seven of the eight participants shared they felt that peer collaboration and sharing were essential to their skill growth and use of Chromebooks to support instruction. Clavin appreciates peer collaboration, "I get help from my neighboring teachers. Somebody will watch me do something and be like, "You know you could do it this way, right?" Chambers said "If we're all planning together and sharing resources, I think it just helps. And just, I don't know, we're all in this together. We keep saying that. We're all in this together." Malone stressed the importance of awareness and peer relationships,

> I rely a lot on my other co-workers. I find out what they're doing. I feel like I have really great relationships with a lot of people across different departments. So, I think,

you know, I find the time to have those conversations to see what's working.  I've

looked at the tutorials, but I don't think anything beats that--What's working in your

room? Right? Show me. Walk me through that. How does that work? Um, you know,

and that's probably the primary way that I grow.

Howe shared that she also appreciates what she learned by talking to other teachers

about what's working in their classroom:

I think the most useful professional development for using technology is when teachers

can showcase tools that they've used to create engaging work. And, that's what I like to

hear the most. When teachers say, I did this really cool project that students really

loved, and here's what I used to do it. And then I can look and say, Oh, I could see how

that would fit in my class.

***Workshops and formal training.*** Traditional professional development workshops

offered by the school and outside conferences contributed to the skill development of two

participants. Tortelli reported that,

The professional development at the beginning of this school year was amazing! I

mean, the problem was, we had all these PD days, and I filled them all with technology

training every day. I think there was maybe one I chose not to go to. And that was it.

Like, I just went to everything. And I kept saying to other people, how are people not

going to these?

Clavin mentioned past opportunities for professional development offered by the

school, "We had whole PDs [workshops] run around exploring ways to use the computer.

Whether they were apps, or sites like Edpuzzle, or Kahoot, or things like that; ways to organize

information." As Sternin explained, even with all of these options, there's still a need for individual tech mentoring,

> The training, I feel like, doesn't like, apply to real time. Here's my issue right now, or this is what I'm planning on doing for this particular activity? How can this fit in? And it's kind of… [paused] I'd love to see it honestly, in something like PD [professional development], I've been begging for that for years. And I just [paused] it never seems to materialize. I think there's been an issue with training. It's been all about, here, here's a video here, here, go listen to this, or come listen to that, or try this. It's not really been actually integrated in our classroom.

**Interview question three.** In this section participant responses to interview question three, "In what ways has the use of Chromebooks impacted student engagement?" are presented. Responses to this question revealed three types of engagement per participant responses: (a) student engagement with the curriculum, (b) student engagement with other students, and (c) student engagement with the teacher.

***Student engagement with the curriculum.*** Boyd explained that Chromebooks and digital resources have an impact on how students engage with the curriculum,

> When there's an element of pizzazz [in the lesson], or excitement or difference to it, then it's exciting, you know, then it's like attention grabbing. And attention grabbing usually means increased focus. And when you've got increased focus, you potentially have more learning going on. And so, the goal is learning.

Sternin shared a story about a particular student finding engagement and confidence when using digital tools available on his Chromebook to complete a project,

He was able to [create] an image of the bird [on his Chromebook]. He was so excited about it, that he didn't finish it. But he had done so much work on it. It was so obvious. And he was going to hang it once he finished it. He was going to hang up his room. Just to see that excitement about it [the project] was great. It's the same kind of excitement you'd see with somebody that like, all of a sudden discovered they could draw or paint or something.

Howe explained, "I think that Chromebooks have really allowed me to be more of a project-based teacher, right? We're doing work and we're creating."

***Student engagement with other students.*** Tortelli found that the presence of Chromebooks in the classroom could negatively impact student engagement, "I feel like they're just, they're on their Chromebook. And they're just hyper-focused on this. Because they're staring at a screen [paused]. I think they have more tunnel-vision on the screen, where if they were doing it on their desk, they would be having more conversations with the person sitting next to them." Clavin added, "Engagement with the class and the teacher is not great."

Chromebooks can also distract students and inhibit natural communication in the classroom. Tortelli said that "I think one unintended consequence is just that they [students] talk less, they communicate less." Boyd added that, "I think they like turning that device on. They like seeing what pops up. I travel around the classroom sometimes, and it's like, get off that video, get off that YouTube thing."

Chambers mentioned that Chromebooks have also encouraged communication between students, saying "There is sort of a security blanket in these computers. Maybe they are able to open up more through the use of this device than they would if we were in the classroom." Malone mentioned the advantages of digital collaboration between students, "Being able to

work off of a single document with a group has been all these with all the resources and tools that these machines can provide."

***Student engagement with the teacher.*** Peterson shared that he believes the Chromebook can be a literal barrier saying, "The notion that a kid had literally a screen that was between us, is the only thing that I ever found concerning." Malone shared his thoughts on how important it is to engage students in a conversation,

> A Chromebook doesn't help with that [conversation] necessarily. At times, it might even get in the way of a student's ability to truly listen and have that back and forth. That's always gonna be something that I consider essential for humanities classes like English, you know? I do think it can get in the way of that, and you can lose sight of what I believe in education and humanities, which is, you know, lively discussion.

**Interview question four.** Participant responses to interview question four, "How has teaching in a 1:1 Chromebook environment changed your instructional methodology and/or philosophy?" are presented in this section. Five participants reported perceived advantages in the areas of efficiency and organization when using Chromebooks and digital tools with students. Four participants noted the importance of student equity to access resources outside of school.

***Access and equity to resources outside of the classroom.*** Chambers pointed out that the classroom environment extends beyond the physical classroom,

> So, when we do everything on the computer, when we have a student that is absent, it's all there. Right? Don't get me wrong, but arguably, if you're keeping up with your agenda, and you know, if it's all there, arguably, if a kid is going to look, then there's no "Hey, Mrs. [Chambers], can we meet to discuss what we went over in class

yesterday?" I realize that access to curriculum can be so different. If we utilize these tools, right, students can still have me in front of them [on recorded video] going through it.

Peterson shared his philosophy about the importance and value of being in the classroom and his preference for having computer work done at home,

I always use it more for homework or for projects, as opposed to in class activities. And I've maintained that, that I think, as I say to the students, I don't like using class time for something you couldn't just be doing on your own anyway. That's why you're here. I want to be worth your while.

Participants mentioned that the presence of Chromebooks has significantly changed their instructional methodology. Howe said,

Chromebooks were adopted as our 1:1 device, and I can't imagine teaching without them anymore." Sternin has gained an appreciation for the Chromebooks, "I didn't really use the [Google] Classroom, you know? Like, now… this is the only way you can do what you need to do. You know? To communicate with kids and work with kids and so forth. I think I've learned to appreciate the one on one a lot more."

Malone's response focused on student equity, access to digital resources, and the benefits of having school-provided Chromebooks:

You know, we have students from certain communities who don't have the same access to technology or computers. And before [1:1 Chromebooks] I would assign assignments, and you could tell. You could tell the kids who could sit down at a computer on their own for a few hours, and the ones who were sharing computers, or

not having access to computers. And, you know, for me; What am I really assessing at that point? You know?

*Efficiency.* Per participant responses, the organization and efficiency of using digital tools also impacted the traditional routines of teachers. Boyd stated,

There're some real benefits. You could organize things, you can set kind of a "to do" and in what order, without having to write it down on paper. And then, kind of follow along with that, right? You can have two, those two documents up at the same time. Whereas, if I'm writing, I can write on this document, and I can get another piece of paper, right? But that's pretty laborious. Even though I think paper and pencil are great, I think that becomes laborious. And that's a turn off when a kid could pull up a couple tabs at the same time and then flip back and forth from tab to tab to gather data to put into a final document. I think that that's a real benefit.

Tortelli responded to question four with a description of how she utilized Chromebooks in the classroom and its connection to saving time with assignment completion,

I use the Chromebooks the most in my geometry classes for Geogebra. The great part about Geogebra is that I could make something and then I could say go to this link, and then they could just go and drag it around. So very quickly, take out your Chromebook, open this up. Oh, you don't have your Chromebook. Just pair up with somebody else. And in five or 10 minutes, they could see something where that construction that I did in, you know, my 20 years prior, maybe took them 20 minutes to make. So, such a time saver.

Howe commented on her ability to get through more content once every student in her class had their own Chromebook,

I've seen a change in our ability to be efficient. And so, we have a level of efficiency

that I couldn't achieve when I was signing out Chromebooks from a cart. I can get

through more things, or go into more depth, with content than we could before. They

[students] certainly are covering more ground than we did before [having 1:1

Chromebooks].

Peterson pointed out the benefits of allowing students to do their work outside of the

allotted class time,

I like some of the efficiency. You know? You can just get stuff done with the kids; you

know? Whether it's an essay that I can just account for, or for multiple choice tests or

something, or whatever. I can let them do that in the off hours.

Clavin mentioned the efficiency and benefits to both the student and the teacher in

terms of having content accessible and available for retakes and makeup work,

We're more willing to let students redo work, review, do it again, you know, which is

beneficial repetition helps memory, because we don't end up having to re-correct

something eight times. If a kid wants to watch a video eight times and keep trying the

questions until they get it right, I can just hit a little button and there you go, kid. Do it

again. You know?  We're less reticent to allow that when you have everything at your

fingertips rather than having to produce it from scratch. Having them [the

Chromebooks] in class has changed my approach a little bit, because it has allowed me

to sometimes integrate virtual experiments and labs that we otherwise couldn't do.

**Interview question five.** Presented in this section are participant responses to interview

question five, "In what ways does the school support teacher collaboration and experimentation

with new technologies?"  Participants' responses indicated that they were encouraged to

experiment with, and to incorporate 1:1 Chromebooks in their methodology. However, none of the participant responses indicated any pressure from the administration or the school community to do so. Seven of the eight participants emphasized their desire to improve their instruction through increased collaboration with their peers.

Chambers expressed her desire for more cooperation among teachers saying, "I wish that more of my colleagues would work smarter, not harder. I wish that more of us came together to provide a universal experience for our students." Malone said,

I'd like more time to collaborate, more time to just talk with other teachers, more time to get that feedback, you know? There's something they could be doing, something really cool, down that hall, that would really work in my room, and with my lesson. Unless I have those opportunities, or I have a personal relationship with that teacher, there's not really a space for me to learn that.

Tortelli shared the benefits of interacting with other teachers to become inspired to use new technologies,

At the beginning of the year, a bunch of math teachers were all going and eating outside. And I remember one day, one of the teachers came with a list of questions. And she was like, "Okay, this is what I need to know" and it was all technology stuff. And we would say "what are you using? How is it going?" And that was so valuable to meet a few days a week to have lunch with my peers, so that we can talk about what's working, and what's not working.

Peterson mentioned the role of the administration in encouraging teachers to use Chromebooks. He said:

The best thing they [administration] have done was allow us to use the technology as we were growing comfortable with it. I didn't think there was any pressure. You just took advantage of it if it made sense for you. And if you didn't, I didn't think there was any real question or concern, which I thought was okay.

Howe mentioned that perhaps the administration could do more, saying "I feel like this is an investment that the district has made. And I think it's okay for leadership to say we have to implement them, at least in some way."

**Interview question six.** In this section participant responses to interview question six, "What, if any, barriers are in the way of using Chromebooks to support teaching and learning?" are presented. Participant responses revealed four perceived barriers to using Chromebooks to support teaching and learning: (a) time and effort, (b) classroom technology support, (c) student's lack of responsibility, and (d) multiple Chromebook models.

***Time and effort.*** Chambers said:

I've been pretty vocal; I've spoken up before that I wish we had more time; that gift of time to devote to such things [technology integration]. But once it's created, and once you become familiar with it, and you're really using it to inform your teaching, I think it's been really fantastic. But how many times have I read the technology newsletter and then [thought], nobody's got time for that?

Malone mentioned that initial effort can sometimes be intimidating. "You know, things don't always work the way you want them to. And so, you adapt, and then the next time around, it gets a little bit better." Tortelli expressed the feeling of being overwhelmed, "One of the math teachers said, "try jam board, I love it, I love it." And I was like, I can't, I'm full." Howe recognized that not every teacher is comfortable with technology,

There are people who are not--who don't feel like they are empowered to use the

Chromebooks. And when kids say, "I have a problem." They don't know how to

troubleshoot it with kids. And that feels very frustrating. It keeps them from using those

tools.

***Classroom technology support.*** Sternin mentioned the discomforts and unpreparedness

of teachers to troubleshot technical issues in their classrooms,

Problem solving is just becoming the norm now, for everybody, not just the students.

And, you know, learning how to get through that. We are increasing problem solving a

little bit more, almost too much, maybe.

The level of technology support offered by the school seemed to be sufficient. Clavin

reported, "From what I'm hearing from my students, in general, we're pretty good at helping

and maintaining…helping fix and loaning out and maintaining their devices while they're

here." Sternin mentioned, "I think the number one thing is that we always have somebody; we

have multiple people that we can reach out to."

***Students' lack of responsibility.*** Six participant responses indicated that students either

did not bring their devices to school, or did not bring them fully charged, causing immediate

instructional issues in the classroom. Chambers relates her experience saying,

I forgot my Chromebook. I forgot my charger." [student speaking] And so I've tried, as

the team leader, we purchased chargers, you know? We're trying to find ways to get

over some of those hurdles that really, we have no control over. I have conversations

with my students, "Hey, you know, that device that you carry with you everywhere?

Plug in your Chromebook, you know?"

Sternin indicated that some students may now be using the Chromebook as an excuse for not doing their work,

> I tend to teach the kids that are really the tough kids, the ones that, you know [paused] there used to be the dog ate the homework excuse and now it's "Oh, I didn't charge it," or "Oh, yeah, my screen is broken," or "I had it taken away because I abuse my privileges." And so, I'd have a, you know, mishmash or hodgepodge of kids like that in every class. There was lots of "Well, I don't have a charger" and "it's not working" being that it was an essential studies level class.

Boyd expressed her frustration with the unpredictable teaching environment this way, "If the Chromebook is not there, and you're expecting kids to do something, or the Chromebook screen broke, because they sat on the doggone thing, that becomes the issue for me."

> ***Multiple Chromebook models.*** Another factor that teachers reported as frustrating was the difference in device models. Coastal High School purchases devices annually and the models change over time adding complexity to the classroom environment. Clavin explained,

> This new group [incoming freshmen] has touch screens, which might add some functionality. So, in my classes with mixed students, I have, this year won't be a problem. But next year, I'll have sophomores, juniors, and seniors. I probably won't use that functionality they have until everybody has it. So that might be a little bit of a drawback that there are things I could see that I could do, but I really can't, because I can't give it to everybody.

Chambers said, "I think maybe one of the frustrations as a teacher is when we were 1:1, it was like, at least two different devices [Chromebook models]. So, there were different

chargers." Boyd mentioned the difficulty in finding a way to help her students when they came to class without their Chromebook chargers,

So that's still been kind of a challenge, because the [Chromebook] chargers change. And so, then the extra chargers I have in my room don't necessarily work with the Chromebooks of the kids that I teach. And then, sometimes I have all four years in a class. And so, I have to like, figure out. Like, "Okay, are you a sophomore? Okay, which charger is that? Okay, the teacher down the hall has that one."

**Interview question seven.** Participant responses to interview question seven, "Has the use of Chromebooks impacted your instructional environment in any unintended or unexpected way?" are presented in this section. Participant responses fell into two main categories, the immediacy and pressure to respond when working in an online environment, and the disconnect between instructional technology and brain-based learning theory.

With web-based platforms like PowerSchool, students and parents have online access to the attendance records and grades. Clavin lamented that, "having PowerSchool and PowerTeacher, and then the kid's ability to look their grades up at any time is a blessing and a curse." He further explained the expectations of kids and parents saying:

They watch what they want when they want. They listen to what song they want when they want. You know, there's no commercials, there's no breaks, everything is just there. And they start to expect that we are that way. We're an on-demand teacher, you know, that part, I think they forget that this isn't a video game. And it just racks up points literally on the fly. We have to sit down and think about what we're doing [when correcting assignments] and be mindful of where we're taking points off where we're awarding credit.

Tortelli saw a positive in that immediate accessibility of grading and assignment information saying:

I think my students know a little bit better, where their grades are, because they all have the technology to check their grades. They go to PowerSchool or look on [Google] Classroom to see what their missing assignments are. I think they're a little bit more in touch, instead of it being this mystery of, "how am I doing?"

Boyd pointed out a common misperception about high school students having innate digital literacy skills, "Frequently people say kids really can navigate around the Internet super well, because they play video games. Well, that's not true. They play video games [paused] which is totally separate from doing a lot of the other things."

Two participants were concerned with the clash between technology and efficiency and the science of brain-based learning. Boyd explained it this way,

Now there's a benefit to pen and paper and eye-hand coordination. When you write something down, it begins to cement that into your brain, according to the research, and I believe it [happens] much more quickly than typing it out. The same thing with taking notes. So, what was expedited on one hand, you know, it had pluses and minuses in terms of what we could lose.

Clavin also noted the drawbacks to students typing their notes versus writing them out on a piece of paper,

Some kids were typing their notes rather than writing them down. And there's a plethora of studies that show that that's not nearly as useful when it comes to engaging memory. So, I wasn't very pleased since I teach a whole brain unit on memory and how to incorporate material into your skull.

Clavin also explained the impact the convenience of technology can have upon learning in general:

We were seeing it before with phones, you'd write notes at the board, and the kids would sit there. And then, just before you erased it, they'd throw up their phone and click a picture of it. And if you ask them [students] anonymously, or sometimes you didn't even need it to be anonymous. "How many of you ever look at those pictures?" None. None of them ever went back into their phones. So, it's just taken up phone memory, or cloud space. So, I'd asked them why they did it. And they [students] said, "well, because now I have the notes." Well, what's the point? If you'd never engage with the material? You know, they say, "Well, I have the notes. I feel good. I did my part. I took the notes." No, you didn't. You stole the notes. You know, you took a picture, and you stole the notes and then you put them away and you never looked at them. Of course, you don't know the material, but they think they do because they have acquired the thing.

**Interview question eight.** Presented in this section are participant responses to interview question eight, "Is there anything else you would like to add about your experience teaching in a 1:1 Chromebook environment that we have not had a chance to discuss?". Participants declined to add anything else or used this opportunity to speak further about a previously asked question. The researcher has included any additional participant responses under the appropriate question where relevant.

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**Summary**

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Eight Coastal High School teachers participated in this narrative inquiry study designed to fully explore teachers' lived experiences teaching in the 1:1 Chromebook

environment at CHS.The sample group consisted of all high school teachers who had 3 or more years' experience working at CHS, had participated in some form of professional development supporting the use of 1:1 Chromebooks, and had designed and delivered lessons in a 1:1 Chromebook setting. Although archival data was instrumental in understanding the rationale for the 1:1 Chromebook program at CHS and the logistics of the implementation, individual participant data were collected using a single instrumentation tool of semi-structured interviews. The procedure for the analysis of the semi-structured participant interviews followed Creswell's (2019) five coding steps. Subsequently, seven emerging themes were identified, (a) the instructional effectiveness of Chromebooks, (b) teachers' preferred methods of professional learning, (c) student engagement, (d) performance expectancy, (e) effort expectancy, (f) social influence, and (g) facilitating conditions. The findings from the participant interviews connected to the research questions are discussed in Chapter 5, including the researcher's interpretations, a deeper dive on the implications of the findings, recommendations for action, and recommendations for further study.

**CHAPTER 5: CONCLUSION**

In this study, the researcher investigated high school teachers' perceptions of their experiences teaching in a 1:1 Chromebook environment. Data collection occurred from analyzing archival data and interpreting teachers' personal narratives detailing their experiences using of 1:1 Chromebooks to support teaching and learning. The participants represented the teachers at Coastal High School. Eight qualified participants volunteered for interviews. Interviews were conducted in December 2020. Interview data was transcribed, and the procedure for the analysis of the semi-structured participant interviews followed Creswell's (2019) five coding steps. Interview data was analyzed to determine common words, expressions, and ideas. The researcher created an iteration table for the interview question responses that revealed patterns and categories and ultimately led to the discovery of emergent themes.

The following research questions guided the study:

**RQ 1:** What are the CHS teachers' perceptions of the effectiveness of 1:1 Chromebook environments as an instructional tool?

**RQ 2:** What, if any, professional learning and/or training has been most effective in changing instructional methodology to include student Chromebooks as perceived by CHS teachers?

**RQ 3:** What impact has the 1:1 use of Chromebooks had on student engagement as perceived by CHS teachers?

**Interpretation of Findings**

Results from this study were examined through a qualitative research lens. Connections were made from the literature review in Chapter two. The purpose of this

qualitative narrative study was to fully explore teachers' lived experiences teaching in the 1:1 Chromebook environment at Coastal High School. The researcher collected data through analysis of teacher's semi-structured interview transcripts which revealed their personal experiences, observations, and stories about teaching and learning in a 1:1 high school Chromebook environment.

The analysis of CHS teachers' use and adoption of 1:1 Chromebook technology was supported by UTAUT (Venkatesh et al., 2003). This theoretical framework was used to predict the likelihood of successful technology implementation and helped provide a framework for this research. Data for this study included archival records and transcripts of semi-structured interviews with participants. The seven emergent themes presented in Chapter 4 are the basis for discussion of this study's findings: (a) the instructional effectiveness of Chromebooks, (b) teachers' preferred methods of professional learning, (c) student engagement, (d) performance expectancy, (e) effort expectancy, (f) social influence, and (g) facilitating conditions. After thorough analysis and coding of data the researcher reached conclusions based upon the three research questions and the four constructs of the UTAUT framework.

**Instructional Effectiveness**

In question one, the researcher asked, "What are the CHS teachers' perceptions of the effectiveness of 1:1 Chromebook environments as an instructional tool?" Five of the eight participants mentioned that the CHS 1:1 Chromebook environment has created equitable access for students to academic resources both in and out of school.  Malone shared:

> You know, we have students from certain communities who don't have the same access
>
> to technology or computers. And before [1:1 Chromebooks] I would assign
>
> assignments, and you could tell. You could tell the kids who could sit down at a

computer on their own for a few hours, and the ones who were sharing computers, or not having access to computers.

Equity of access to resources and information, regardless of socio-economic level, is one of the central reasons why schools choose to provide their students with laptops (Warschauer, et. al, 2004) and is recognized as a priority in the CHS technology planning document (CHS Technology Plan, 2020).

Data collected from six participants in this study indicated that the use of Chromebooks and digital resources has created efficiencies for instruction. Howe said, "we have a level of efficiency that I couldn't achieve when I was signing out Chromebooks from a cart. I can get through more things, or go into more depth, with content than we could before." This has also allowed for students to make multiple attempts to demonstrate mastery of content. Clavin remarked on how easy it is saying, "If a kid wants to watch a video eight times and keep trying the questions until they get it right, I can just hit a little button and there you go, kid. Do it again."

Based upon the narratives of participants in this study, there has been a perceptible shift towards project-based and student-centered learning since the introduction of 1:1 Chromebooks at CHS. This self-directed, constructivist form of learning can empower students and make them feel more validated in their work (McKnight et al., 2016). Penuel (2006) found that connected devices exponentially expand the resources available to students, and this access ultimately allows students the freedom to determine much of their own educational experience (Grundmeyer & Peters, 2016). Sternin shared a story about one of her students finding engagement and confidence when using digital tools available on his Chromebook to complete a project that had previously consisted of a written report,

He was able to create an image of the bird [on his Chromebook]. He was so excited

about it that he didn't finish it. But he had done so much work on it. It was so obvious.

And he was going to hang it once he finished it. He was going to hang up his room. Just

to see that excitement about it was great. It's the same kind of excitement you'd see

with somebody that, all of a sudden discovered they could draw or paint or something.

**Professional Learning**

In question two, the researcher asked, "What, if any, professional learning and/or

training has been most effective in changing instructional methodology to include student

Chromebooks as perceived by CHS teachers?" Seven of the eight participants indicated a

preference for informal peer collaboration over structured workshops. The credibility of peer

recommendations creates an environment of trust, confidence, and support that that encourages

experimentation (Inan & Lowther, 2010). Given the effectiveness and appreciation for peer

collaboration, professional development time must be set aside for collaboration between

teachers (Cuban, Kilpatrick, & peck, 2001; Inan & Lowther, 2010.)

Communication and sharing of best practices using 1:1 Chromebooks to support

teaching and learning is essential to changing pedagogy and introducing new methods of

instruction. The teachers must first believe that an approach can be successful (Bebell & Kay,

2010) and applicable to their own situation (Liao, et al., 2017; Guskey, 2002) before changing

their practice. Howe explained,

I think the most useful professional development for using technology is when teachers

can showcase tools that they have used to create engaging work. And, that's what I like

to hear the most. When teachers say, I did this really cool project that students really

loved, and here's what I used to do it. And then I can look and say, Oh, I could see how that would fit in my class.

All participants agreed that independent learning was a requirement for any teacher wanting to advance their technical skills. The learning that happens because of experimentation, trial and error, and investigation gives teachers the confidence to try new pedagogical approaches with their students. Boyd explained the need for experimentation saying,

If you want us to get better at something, then you gotta let us learn to play and explore. I got permission to take mine [laptop] home for the summer… as a result, I came back in the fall steps ahead of other people.

## Student Engagement

The researcher asked in question three, "What impact has the 1:1 use of Chromebooks had on student engagement as perceived by CHS teachers?" Three different categories of engagement emerged from analysis of the eight participant interviews. Concerning engagement with the curriculum, participants mentioned that the computer itself can be a hook for some students. Boyd explained, "When there's an element of pizzazz [in the lesson], or excitement or difference to it, then it's exciting, you know, then it's like attention grabbing. And attention grabbing usually means increased focus."

Engagement can also refer to communication between students, or between students and teachers. Chromebooks allow for digital collaboration across time and space but can impede communication and discussion in a more traditional classroom setting. Peterson said, "the notion that a kid literally had a screen that was between us, is the only thing I ever found

concerning." Malone mentioned that "the [the Chromebook] can get it the way of a student's ability to truly listen and have a back and forth."

However, teachers also commented on improved communication and engagement from shy students or students unable to attend in person. Chambers said, "There is sort of a security blanket in these computers. Maybe they are able to open up more using this device than they would if we were in the classroom."

## Performance Expectancy

One of the four constructs of the UTAUT framework, performance expectancy is "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (Venkatesh et al., 2003, p. 447). Six participants indicated perceived value in the use of 1:1 Chromebooks to achieve classroom efficiency, (b) five participants reported perceived value in equity of access, and (c) three participants mentioned perceived value of increased student autonomy.

## Effort Expectancy

In the UTAUT framework, effort expectancy is concerned with the ease of use of the system by participants (Venkatesh et al., 2003).  Three areas of concern were voiced during participant interviews in terms of effort expectancy: (a) the time needed to plan and research new methodology, (b) the effort to understand and use new digital resources, and (c) the anxiety of troubleshooting technical issues in the classroom.

The lack of time set aside for technology integration and exploration activities can derail a teacher's well-intentioned efforts to utilize 1:1 Chromebooks. Becker (1994) estimated that it can take 5 years or more for teachers to gain the professional knowledge necessary to use technology in any significant way. Acknowledging the importance of time for teachers to

learn how to integrate Chromebooks, Chambers said, "Time has been, I think, the largest challenge… I wish we had more time. That gift of time to devote to such things."

**Social Influence**

Social influence is concerned with the expectation of others to see the new technology systems being utilized (Venkatesh et al., 2003). Concerning expectations or pressure from school administrators, three participants said they have the freedom to use technology at their own discretion. Although having the freedom to choose if, when and how to use 1:1 Chromebook is liberating and appreciated, two participants expressed a desire to have a bit more standardization regarding technology integration. Howe said, "I feel like this is an investment that the district has made. And I think it's okay for leadership to say we have to implement them, at least in some way." Chambers said, "I wish that more of us came together to provide a universal experience for our students. If we're all planning together and sharing resources, I think it just helps."

All participants said that they were influenced by their peers regarding Chromebook use and technology integration. Peer influence is a powerful force in changing behaviors (Inan & Lowther, 2010). The instructional methodology of a trusted colleague in the same school environment is authentic (Guskey, 2002) and uniquely situated to the individual teacher's learning environment (Liao et al., 2017).  Howe shared an experience which validates peer collaboration,

> I did this webinar about running a virtual mock election. And it was incredible the stuff they were presenting. I decided to Google the school. And it's like this $50,000 a year boarding school in Massachusetts, where they ran this thing. And I was like, these aren't the kids I teach. It feels disconnected from what I do.  But the fact that we can

encourage teachers who teach up the hallway to talk to each other, I think that's really important.

## Facilitating Conditions

In the UTAUT framework, facilitating conditions are defined as the "degree to which an individual believes that the organizational infrastructure exists to support the use of technology" (Venkatesh et al., 2003, p. 447). Seven of the eight participants reported good technical support from the school IT department. However, the inconsistent presence of student devices has proven to be a real barrier to full 1:1 implementation.

Six participants complained that students either forget their Chromebooks at home or brought them to school uncharged. This lack of dependability creates an unpredictable environment and sabotages efforts made by teachers to incorporate 1:1 Chromebooks in their lesson designs. Boyd explained, "If the Chromebook is not there, and you're expecting kids to do something… that becomes the issue for me."

## Unexpected Findings

Throughout the course of this study, the researcher learned from participant interviews that (a) digital cheating has been accelerated by the existence of 1:1 Chromebooks, (b) teachers are feeling overwhelmed by the "on-demand" expectations of students and parents, and (c) there is concern that 1:1 Chromebook use conflicts with brain-based learning theory. Clavin reported the kinds of cheating he has observed regularly in his classes,

> The amount of cheating is gone up significantly. The ability to screenshot a quiz or a test and send it to your friends with literally a couple clicks of your finger and even if you don't want to screenshot even if we came up with a way to log when they did it,

then they just pick up their phone and take a screenshot and we'll never know. I got

multiple times this year where kids have passed in each other's work.

The pressure and expectation for immediate feedback from teachers is something that

Howe attributes to the increase in technology,

I think that they have a sense parents and students, that teachers, are online all the time.

Like, we are constantly sitting at these screens waiting for them to reach out to us.  And

so, I had this weekend, I have had students reach out as if there is some kind of critical

emergency on a Sunday night and I am not interested. So, I think there has been some

pressure to be available more hours as a result of the increased use of technology.

Two participants implied that the efficiencies of using a Chromebook might impair a

student's ability to retain information based upon current literature on brain-based learning

theory. There was some concern about the efficacy of typing notes during class as opposed to

writing them out by hand. Boyd related her concerns about notetaking with Chromebooks,

There's a benefit to pen and paper and eye-hand coordination. It has to do with reading.

Really specifically, it's reading. It cements information when you have to write it out

by hand. They [students] can type it in more quickly. And that was a faster way to get a

kid to do something, and sometimes it's an easier way. But what was lost by doing it

the easier way, was the eye-hand coordination piece. And the fact that when you write

something down, it begins to cement that into your brain according to the research.

And I believe it does so more quickly than typing it out.  The same thing with taking

notes.

Whereas each of these findings impacts teacher perceptions of teaching and learning in

a 1:1 Chromebook environment, they are not directly correlated with this study's research

questions. However, both are relevant to educating students in a 1:1 learning environment and are worthy of further investigation.

## Implications

The results of this study contain implications for the educators that work at schools with 1:1 Chromebook environments. Coastal High School is unique, and the population studied is quite small; therefore, these findings cannot be generalized and expanded to inform educational policy and practice at other schools. The following areas provide implications for consideration, (a) performance expectancy, (b) professional development, (c) student engagement, and (d) barriers to implementation.

### Performance Expectancy

Venkatesh et al. (2003) defined performance expectancy as the users' perceived value employing a given technology to accomplish a task. This expectancy is what drives teachers to integrate 1:1 Chromebooks in their instruction to improve student outcomes. The results from this study show two clear areas of performance expectancy: equity and efficiency. The implication is that teachers at CHS believe that their 1:1 Chromebook environment provides more equitable learning opportunities for their students. The teachers recognize the potential for increased efficiencies in routine tasks for both students and teachers by utilizing 1:1 Chromebooks.

### Professional Development

Teachers must develop new capacities for facilitation, coaching, consultation, and improvisation ("Toward a New Learning Ecology," n.d.). Professional development can be offered formally in a workshop setting led by an instructor or more informally. Learners can gain new knowledge through collaboration, observation, exploration, daily practice, and

reflection (Dabbagh & Kitsantas, 2012) with their peers. Peer collaboration was reported by seven of the eight participants as the most effective and most desired form of professional development. The implication is that school leaders could provide ample time and opportunities for teachers to collaborate with their peers on 1:1 Chromebook integration strategies. As Chambers shared regarding the need for professional development, "I wish we had more time, that gift of time, to devote to such things."

**Student Engagement**

The data from this study indicated both positive and negative perceptions on the impact of 1:1 Chromebooks on student engagement.  The three main areas of engagement were categorized as (a) student and content, (b) student and teacher, and (c) student and student. Per the participants, students seem to be more engaged with the content and with each other. However, direct student engagement with their teachers was negatively impacted according to four participants. Peterson said, "The notion that a kid had literally a screen that was between us, is the only thing that I ever found concerning." Four participants also reported a general shift towards student-centered or project-based learning and less teacher-driven activities.

The implication is that teachers are attempting to find a balance where students can engage with the content and with each other using 1:1 Chromebooks, but not lose the important connection they have with their teachers in the physical classroom space. Peterson explained his strategy for determining use of the 1:1 Chromebooks this way,

> So, I don't really see that the technology is diminishing any kind of the dynamic, it's
> more than the amount of the use of it. That's all. But I still have to admit, I'm
> concerned. Yeah. And I like some of the efficiency, you know? You can just get stuff
> done with kids, you know? Whether it's an essay that I can just account for, or for

multiple choice tests or something or other, it's okay. I can I let them do that in the off hours. I always use it more for homework or for projects, as opposed to in-class activities. And I've maintained that, as I say to the students, I don't like using class time for something you could just be doing on your own anyway. That's why you're here. I want it to be worth your while.

## Barriers to Implementation

The researcher discovered four common barriers to 1:1 Chromebook use and acceptance by teachers at CHS, (a) the lack of spare battery chargers at school, (b) missing student Chromebooks, (c) technical issues and need for support, and (d) the need for additional planning time. These external barriers (Ertmer, 1995) to teacher acceptance can compromise any efforts to fully integrate 1:1 Chromebooks to support teaching and learning. The implication is that school leaders must recognize the barriers to 1:1 Chromebook adoption and provide the necessary resources and supports to facilitate implementation.

## Recommendations for Action

Data analysis of the eight semi-structured interviews with participants has led the researcher to make the following recommendations for action (a) increased time for peer collaboration, (b) additional Chromebook resources, and (c) transformational leadership. Each of these areas is critical to the success and growth of the 1:1 Chromebook program at Coastal High School. Understanding the perceptions of the CHS teachers in this study will allow school administrators to respond with appropriate guidance and resources to support the efforts of teachers to utilize 1:1 Chromebooks to support teaching and learning.

**Increased Time for Peer Collaboration**

This researcher recommends that persons in school leadership create more scheduled time and opportunities for teachers to collaborate with their peers on best practices for integrating 1:1 Chromebooks to support teaching and learning. Seven of the eight participants in this study indicated a desire for additional time to collaborate with their peers on best practices and instructional strategies using 1:1 Chromebooks. The ideas, confidence, and skills acquired through conversations and observations of teachers in their own building contributes to a culture of transformational change.

Teachers use their judgment to choose teaching methods that will be most effective in their classroom environment and have proven successful with their unique student population (Guskey, 2002). Therefore, the actions and recommendations of colleagues are very effective at changing teacher perceptions regarding the value of using 1:1 Chromebooks. If teachers believe that an approach can be successful (Bebell & Kay, 2010) and that it is directly applicable to their own situation (Guskey, 2002; Liao, et al., 2017), they will change their practice to the benefit of their students.

**Additional Chromebook Resources**

The degree to which one believes that an organizational and technical infrastructure exists to support the use of technology is referred to as a facilitating condition (Venkatesh et al., 2003). The researcher recommends that the educational leadership improve the facilitating conditions and better support and encourage the use of Chromebooks by addressing urgent need for spare Chromebook chargers as expressed by six study participants. This effort would greatly improve the efficacy and dependability of student Chromebooks and help teachers by providing a more predictable learning environment.

**Transformational Leadership**

Educational leaders must understand their teachers' needs before they can create a

transformative environment encouraging innovation and experimentation (Gil et al., 2018). It is

recommended that school administrators attend staff professional development sessions,

demonstrate use of digital tools, and incorporate technology integration in their routine teacher

observations and evaluations. Close communication with teachers and shared experiences will

help develop school administrators' understanding and empathy for the unique challenges their

teachers face when using 1:1 Chromebooks. Empathy not only helps to build relationships and

form a culture of communication in schools, but also helps them to solve problems more

effectively (Bushuyev, Kozyr & Rusan, 2020).

Four of the eight participants in this study communicated their appreciation for an

administration that allows teachers to make their own decisions regarding the use of

technology in their classes. However, there is also a desire voiced by two participants for

clarity of teacher expectations for 1:1 Chromebook use. It is recommended that the CHS school

administration collaborate with teacher leaders to craft a vision for Chromebook integration

that is tightly aligned with curricular goals and workable in design.

**Recommendations for Further Study**

This qualitative study generated data that contained high school teachers' perceptions

of their experiences teaching in a 1:1 Chromebook environment. The semi-structured

interviews presented important information relevant to the focus of this study and provided

information for perspective future studies related to educational technology and 1:1

Chromebook use in high schools. The researcher recommends further exploration to fill the

gaps in current research concerning (a) learning theory and laptop use, (b) online cheating, and (c) the impact of online presence to teacher schedules.

**Learning Theory and Laptop Use**

Two participants in this study expressed concern about the jarring disconnect between brain-based learning theory and the use of Chromebooks to support student learning. They stated that the convenience of typing papers and taking photos of the teacher's whiteboard discounts much of what is known regarding memory patterns and knowledge acquisition. This line of inquiry is essential to investigate so that educators can better understand the appropriate use of technology to support learning. Specifically, researchers in the field of learning theory, neuroscience, and psychology may be able to further investigate the memory and data retention of students taking notes on laptops as compared to students writing their notes out by hand.

**Online Cheating**

Three participants in this study expressed concern over a rise in cheating among students using 1:1 Chromebooks to complete their work. They cited the following examples: students texting during assessments, students taking and sharing screenshots of quizzes, and students plagiarizing others' work by copying passages of text written by students or found online. These new forms of digital cheating are worthy of investigation. It is recommended that further studies might examine the extent of this cheating in one-to-one high school programs and consider ways to curb it.

**Impact of Online Presence to Teacher Schedules**

Teachers and students are using digital tools and online resources to create and share massive amounts of data. One of the platforms used by participants in this study is PowerSchool, an online student information system that allows students and parents to see

real-time views of attendance and grading information (Bird, 2006). Two participants in this study mentioned feelings of anxiety, irritation, and pressure over the unrealistic expectations of students and parents to have instant feedback from teachers on assignments and tests. Clavin explained how student expectations can be unreasonable and impossible,

> They'll hand things in and then literally, in the middle of next class, they're sitting in somebody else's classroom emailing me, what did I get? Like, I'm in another class to guys, you know? I'm not correcting your work, while my other students are sitting in front of me. We're on-demand teachers, you know? I think they forget that this isn't a video game that just racks up points literally on the fly. We have to sit down and think about what we're doing when correcting and be mindful of where we're taking points off and where we're awarding credit. In a computer dependent society, parents do the same thing. My kid said they passed it in last night. Like, oh, it's 9:15 in the morning. Yes, they did pass it in last night at 11:15. I wasn't awake. So that part of it, I think, stinks.

The researcher recommends that further studies might explore the effect of online student information systems and student anxiety levels. Researchers could investigate how the transparency of online gradebooks has improved or exacerbated relationships between teachers and families or impacted the evaluation and assessment practices of teachers.

## Conclusion

The purpose of this qualitative narrative inquiry study was to fully explore high school teachers' perceptions of their experiences teaching in a 1:1 Chromebook environment. Data were collected and analyzed using high school teacher's personal narratives detailing their experiences and observations about the use of 1:1 Chromebooks to support teaching and

learning. Evaluation of the study data included the analysis of in-depth interviews with eight high school teachers. The four constructs of the UTAUT provided a theoretical framework for this study.

Educational leaders face significant challenges in understanding the considerable impact of teachers' perceptions on their decision to integrate and effectively use 1:1 Chromebooks with their students. This study provides insight into resolving those difficulties and indicates ways in which schools can support and facilitate 1:1 Chromebook usage and stimulate pedagogical change. Throughout this narrative study, several emergent themes surfaced: (a) instructional effectiveness, (b) professional learning (c) student engagement, (d) performance expectancy, (e) effort expectancy, (f) social influence, and (g) facilitating conditions. The results of this study show a need for increased opportunities for teacher collaboration around successful strategies for using 1:1 Chromebooks to support teaching and learning, ongoing professional development to address the shift in pedagogy towards a student-centered curriculum, and the need for leadership to better understand the perceptions of teachers regarding 1:1 Chromebook implementation so that they may respond with targeted supports and resources.

The data from this study illustrate a successful adoption of 1:1 Chromebooks by teachers at Coastal High School to support teaching and learning. Data indicated that teachers believe the 1:1 Chromebook environment provides students with equity, expanded learning opportunities, improved communication outside of school hours, and increased student engagement. The 1:1 Chromebook environment has greatly impacted teaching methodology and practice. The shift towards a more student-centered curriculum has created efficiencies for teachers, increased autonomy for students, and introduced some concerns about the changing

role of teachers. School leaders and educational change agents need to acknowledge the

perceptions of teachers and understand their needs so that essential supports and resources can

be provided to continue leveraging 1:1 Chromebook technology for the benefit of the school

community and its stakeholders.

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**Appendix A: Interview script and questions**

Hello (Participant's name),

Welcome to the interview. I want to thank you for being a part of the participant recruitment survey process and willingness to participate in this study. Please know this process is entirely voluntary and that if at any point you wish to stop the process, you are welcome to do so. Your identity will remain anonymous, except to me, the researcher. The following questions will be about your past experiences teaching in a 1:1 Chromebook environment; do you still provide verbal consent to participate in the interview process?

Thank you for reconfirming your voluntary acceptance to be a part of the interview process.

1. Please tell me your own story of using Chromebooks to support instruction at CHS.
2. How have you acquired the skills necessary to integrate Chromebooks in your curriculum effectively?
3. In what ways has the use of Chromebooks impacted student engagement?
4. How has teaching in a 1:1 Chromebook environment changed your instructional methodology and/or philosophy?
5. In what ways does the school support teacher collaboration and experimentation with new technologies?
6. What, if any, barriers are in the way of using Chromebooks to support teaching and learning?
7. Has the use of Chromebooks impacted your instructional environment in any unintended or unexpected way? Please explain.

Final question: Before we conclude this interview process, is there anything else you would like to add about your experience teaching in a 1:1 Chromebook environment that we have not had a chance to discuss?

Thank you again for your time and willingness to be a part of my study. I will be in touch regarding the next steps.

**APPENDIX B: Consent Form (Participant Recruitment Survey)**

**UNIVERSITY OF NEW ENGLAND CONSENT FOR PARTICIPATION
IN ANONYMOUS SURVEY RESEARCH**

**Project Title:** 1:1 Chromebooks in High School Classrooms:

Teacher Perceptions of Integration Efforts

**Principal Investigator(s):** Jason B. Saltmarsh

**Introduction:**
Please read this form. You may also request that the form is read to you. The purpose of this form is to give you information about this research study, and if you choose to participate, document that choice.
You are encouraged to ask any questions that you may have about this study, now, during or after the project is complete. You can take as much time as you need to decide whether or not you want to participate. Your participation is voluntary.

<u>**Why is this research study being done?**</u>
Further research is needed to understand what factors or processes should be present to better support teachers in a 1:1 environment. The purpose of this qualitative narrative inquiry study is to fully explore teachers lived experiences teaching in a high school 1:1 Chromebook environment.

<u>**Who will be in this study?**</u>
Participants will need to have met the following criteria for participation in the interview process:
1. They have been teaching full-time at CHS for at least the last three successive school years.
2. They have designed and delivered lessons requiring the use of student Chromebooks for a minimum of three years.
3. They have participated in some professional development activities (formal or informal, instructor-led, or peer collaboration) focused on Chromebook technology integration at CHS.

Persons in the interview process of the study will be selected at random from the participant recruitment survey.

<u>**What will I be asked to do?**</u>
You will be asked to complete the participant recruitment survey honestly and to the best of your ability.

<u>**What are the possible risks of taking part in this study?**</u>
There are no known risks to you as a participant in the research. If you feel uncomfortable and wish to stop the interview, you are welcome to do so at any time during the process.

<u>**What are the possible benefits of taking part in this study?**</u>
Benefits will be adding to field of educational technology research, providing information that may help educational leaders better support teachers' efforts to utilize 1:1 technology, and the possibility to reflect on your own experiences with Chromebook use at your school.

**What will it cost me?**
There is no cost for participation in this study.

**How will my privacy be protected? & How will my data be kept confidential?**
For the participant recruitment survey, the researcher will be using REDCap. All information will be stored on this cloud-based platform approved for use by the University of New England IRB. All participants will remain anonymous to everyone, including the researcher unless you provide your name and contact information for the researcher to add your name to the list of possible candidates to be selected for an interview. There will be no question on the participant recruitment survey that can identify you as the participant. This information gathered through the recruitment survey will be only seen by the researcher and will be kept under a password, where only the researcher will be able to access the files. Any printed documentation and forms will be kept in a locked location of the researcher's home.

**What are my rights as a research participant?**
Your participation is voluntary. You also have the right to remain anonymous if you choose not to consent to be a part of the interview process. If you have chosen to participate in the interview process, then your name and contact information will be made available to the researcher, Jason Saltmarsh. Your decision to participate will have no impact on your current or future relations with the University. Your decision to participate will not affect your relationship with Jason Saltmarsh. You may skip or refuse to answer any question for any reason. If you choose not to participate, there is no penalty to you, and you will not lose any benefits that you are otherwise entitled to receive. You are free to withdraw from this research study at any time, for any reason. If you choose to withdraw from the study, there will be no penalty to you, and you will not lose any benefits that you are otherwise entitled to receive. You will be informed of any significant findings developed during the course of the research that may affect your willingness to participate in the research. If you sustain an injury while participating in this study, your participation may be ended.

**What other options do I have?**
You may choose not to participate or you may choose to stop participating at any point in the process.

**Whom may I contact with questions?**
The researcher conducting this study is: Jason Saltmarsh

For more information regarding this study, please contact Jason Saltmarsh at jsaltmarsh1@une.edu

If you choose to participate in this research study and believe you may have suffered a research related injury, please contact Lead Advisor - Jacqueline Lookabaugh, Ed.D., (207) 602- 2010 or by email at jlookabaugh@une.edu.

If you have any questions or concerns about your rights as a research subject, you may call Mary Bachman DeSilva, Sc.D., Chair of the UNE Institutional Review Board at (207) 221-4567 or irb@une.edu.

**Will I receive a copy of this consent form?**
Yes. You will be given a copy of this consent form, by selecting print and retaining a copy for your files.

**I understand the above description of the research and the risks and benefits**

**associated with my participation as a research subject. I understand that by proceeding with this participant recruitment survey I agree to take part in this research and do so voluntarily.**

**APPENDIX C: Recruitment Survey**

Participant recruitment survey for Initial Data Collection and Study Participants

Please note that this participant recruitment survey is entirely anonymous unless you as the participant, agree to share contact information to possibly participate further in the research interview process.

*Introduction and Consent: Please read the attached document and answer the question and or consent form. Do you agree to continue to participate in the study?*
      A. Yes (Continue to answer the following questions)
      B. No (Please exit the browser. Thank you for your time.)

      1.) Have you worked as a full-time teacher at your current place of employment for three years successive school years or more?
      a. Yes
      b. No

      2.) Have you designed and delivered lessons requiring the use of student Chromebooks for three successive years or more?
      a. Yes
      b. No

      3.) Have you participated in some professional development activities (formal or informal, instructor-led, or peer collaboration) focused on Chromebook technology integration at your place of employment in the last three years?
      c. Yes
      d. No

*lf your answers meet the requirements for possible further participation, and you wish to be considered for the interview process, please respond below. Please note there is a possibility you may not be selected for the study. If you do not wish to participate further, please click submit. Thank you!*

Yes, I would like to participate in the interview process of this study.

Please provide your name and personal email address in the following format: *John - Johndoe@gmail.com*

**APPENDIX D: Consent Form (Interview)**

**UNIVERSITY OF NEW ENGLAND**
**CONSENT FOR PARTICIPATION IN RESEARCH**

**Project Title:** 1:1 Chromebooks in High School Classrooms: Teacher Perceptions of Integration Efforts

**Principal Investigator(s):** Jason B. Saltmarsh

<u>**Introduction:**</u>
Please read this form. You may also request that the form is read to you. The purpose of this form is to give you information about this research study, and if you choose to participate, document that choice.

You are encouraged to ask any questions that you may have about this study, now, during or after the project is complete. You can take as much time as you need to decide whether or not you want to participate. Your participation is voluntary.

<u>**Why is this research study being done?**</u>
Further research is needed to understand what factors or processes should be present in order to better support teachers in a 1:1 environment. The purpose of this qualitative narrative inquiry study is to fully explore teachers lived experiences teaching in a high school 1:1 Chromebook environment.

<u>**Who will be in this study?**</u>
Participants will meet the following criteria:
1. They have been teaching full-time at CHS for at least the last three successive school years.
2. They have designed and delivered lessons requiring the use of student Chromebooks for a minimum of three years.
3. They have participated in some professional development activities (formal or informal, instructor-led, or peer collaboration) focused on Chromebook technology integration at CHS.

Persons in the interview process of the study will be selected at random from the participant recruitment survey.

<u>**What will I be asked to do?**</u>
You will be asked a series of interview questions that are tied to the research questions regarding your perceptions of using Chromebooks to support teaching and learning. During the interview, you will be asked to recall past experiences working and teaching in a high school 1:1 Chromebook environment.

<u>**What are the possible risks of taking part in this study?**</u>
There are no known risks to you as a participant in the research. If you feel uncomfortable and wish to stop the interview, you are welcome to do so at any time during the process.

**What are the possible benefits of taking part in this study?**
Among the benefits of participating in this study will be the chance for you to add to field of educational technology research, providing information that may help educational leaders better support teachers' efforts to utilize 1:1 technology, and the possibility to reflect on your own experiences with Chromebook use at your school.

**What will it cost me?**
There is no cost for participation in this study.

**How will my privacy be protected & How will my data be kept confidential?**
During the interview process, the following will be read aloud to each participant. Their contact (Email and/or Phone), name, and any personal information will be kept confidential, stored in a secure online account protected by two-factor authentication, and known only to the researcher.
1. All interviews will be recorded using the Zoom platform. Recordings will be directly stored on the researcher's computer which is secure and accessible only by the researcher.
2. The recording will be automatically transcribed by Otter.ai (confidential transcription service) and stored in the researcher's personal Google Drive account. Survey transcripts will be named by recording date and a unique two-digit code will be appended to the file name for the researcher to identify participant's transcripts. For example, interviews recorded on December 1, 2020 might look like this: 120120-08 or 120120-32.
3. All data will be analyzed using NVivo qualitative data analysis software. Any collected data will be destroyed after the completion of this study or per the instructions of the University of New England's Internal Review Board.
4. At all times, participant name and contact information will remain completely confidential.

**What are my rights as a research participant?**
Your participation is voluntary. Your decision to participate will have no impact on your current or future relations with the University. Your decision to participate will not affect your relationship with Jason Saltmarsh, the researcher. You may skip or refuse to answer any question for any reason. If you choose not to participate, there is no penalty to you and you will not lose any benefits that you are otherwise entitled to receive. You are free to withdraw from this research study at any time, for any reason. If you choose to withdraw from the research, there will be no penalty to you, and you will not lose any benefits that you are otherwise entitled to receive. You will be informed of any significant findings developed during the course of the research that may affect your willingness to participate in the research. If you sustain an injury while participating in this study, your participation may be ended.

**What other options do I have?**
You may choose not to participate and/or you may choose to stop participating at any point in the process.

**Whom may I contact with Whom may I contact with questions?**
The researcher conducting this study is: Jason B. Saltmarsh

For more information regarding this study, please contact, Jason Saltmarsh at jsaltmarsh1@une.edu.
If you choose to participate in this research study and believe you may have suffered a research related injury, please contact Lead Advisor - Jacqueline Lookabaugh, Ed.D., (207) 602-*221-4960 or* by *email: jlookabaugh@une.edu*

If you have any questions or concerns about your rights as a research subject, you may call Mary Bachman DeSilva, Sc.D., Chair of the UNE Institutional Review Board at (207) 221-4567 or irb@une.edu.

**Will I receive a copy of this consent form?**
Yes. You will be given a copy of this consent form.

**Participant's Statement**
**I understand the above description of this research and the risks and benefits associated with my participation as a research subject. I agree to take part in the research and do so voluntarily.**

_____          _____
**Participant's signature or**                            **Date**
**Legally authorized representative**

_____
**Printed Name**

**Researcher's Statement:**
**The participant named above had sufficient time to consider the information, had an opportunity to ask questions, and voluntarily agreed to be in this study.**

_____          _____
**Researcher's signature**                            **Date**

_____
**Jason Saltmarsh**

## APPENDIX E: Email to Invite Participants for Interview

Dear (Participant's name),

Thank you for completing in the participant recruitment survey and providing consent to participate in the interview portion of this study. The purpose of this qualitative narrative inquiry study is to fully explore teachers lived experiences teaching in a high school 1:1 Chromebook environment.
For reference, a copy of the interview consent form is attached.

### What will I be asked to do?
You will be asked a series of interview questions that are tied to the research questions regarding your perceptions of using Chromebooks to support teaching and learning. During the interview you will be asked to recall past experiences working and teaching in a high school 1:1 Chromebook environment.

### What are the possible risks of taking part in this study?
There are no known risks to you as a participant in the research. If you feel uncomfortable and wish to stop the interview, you are welcome to do so at any time during the process.

### What are the possible benefits of taking part in this study?
Among the benefits of participating in this study will be the chance for you to add to field of educational technology research, providing information that may help educational leaders better support teachers' efforts to utilize 1:1 technology, and the possibility to reflect on your own experiences with Chromebook use at your school.

### What are my rights as a research participant?
Your participation is voluntary. Your decision to participate will have no impact on your current or future relations with the University. Your decision to participate will not affect your relationship with Jason Saltmarsh, the researcher. You may skip or refuse to answer any question for any reason. If you choose not to participate there is no penalty to you and you will not lose any benefits that you are otherwise entitled to receive. You are free to withdraw from this research study at any time, for any reason. You will be informed of any significant findings developed during the course of the research that may affect your willingness to participate in the research. If you sustain an injury while participating in this study, your participation may be ended.

### What other options do I have?
You may choose not to participate, and you may choose to stop participating at any time.

I would like to schedule a time for your 30-minute interview via Zoom within the next two weeks. Please provide me with a few meeting dates and times that would work best for you. Thank you again for choosing to participate in this study. If you there are any questions, please do not hesitate to contact me at jsaltmarsh1@une.edu.

Sincerely, Jason Saltmarsh