1-1-2021

# Trinidad and Tobago Secondary School Principals' Perspectives of Implementing a Laptop Initiative

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This is to certify that the doctoral dissertation by

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Walden University
2021

Abstract

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MA, Walden University, 2012

BS, Carleton University, 2002

Dissertation Submitted in Partial Fulfillment

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Doctor of Philosophy

Educational Technology

Walden University

February 2022

Abstract

The eConnect and Learn (eCAL) program was a government-led, one laptop per child initiative launched in the country of Trinidad and Tobago. However, after investing large sums of money in the program, the initiative was abandoned as unsuccessful. Addressing this problem, the study aimed to explore which factors affected the implementation of the eCAL initiative. The conceptual framework for this basic qualitative study was Hall and Hord's six functions of change facilitators for effective implementation of change. The research question addressed the factors affecting the eCAL initiative from principals' perspective. Interview data were collected from three secondary school principals via email and analyzed using thematic content analysis. As a result, the school leaders believed that creating an environment of change, positive perceptions, vision, teacher support, and professional development were supporting factors of the program implementation. On the other hand, school leaders perceived a lack of formative and ongoing program evaluation, less than positive perceptions, technical issues, poor technical infrastructure, theft, noneducational use of laptops, students not bringing laptops to school, teachers' low self-efficacy, and principals' lack of training as major challenges for the program implementation. These findings suggest offering training for principals in all areas of technology leadership as an essential means to support the implementation of educational ICT initiatives in secondary schools of Trinidad and Tobago. This study may inform stakeholders and policy makers, and help improve the practice of learning and instruction, thus leading to positive social change.

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Chapter 1: Introduction to the Study

Technology integration in teaching and learning has become essential to prepare 21st century learners to work and function in society (Kivunja, 2015; Shaji & Nagaraj, 2018). This understanding prompted the idea of implementing a one laptop per child program also known as a 1:1 initiative in school systems worldwide (Bebell & O'Dwyer, 2010; Islam & Grönlund, 2016; Keane & Keane, 2017; Keengwe et al., 2012; Richardson et al., 2013; Valiente, 2010; Weston & Bain, 2010). The eConnect and Learn (eCAL) program introduced in Trinidad and Tobago was one such initiative. The government-led 1:1 program provided a laptop for each student entering secondary school from the 2010-2011 academic school year (Briggs & Blair, 2016; Jennings, 2017; Onuoha et al., 2015, 2016). The initiative has since been replaced by the 2013 smarTT initiative (George, 2015). However, to date, there seems to be no formal evaluation of the initiative to determine whether the program met its goals as outlined in the policy draft, "to significantly enhance the Trinidad and Tobago education system" (Ministry of Education [MoE], 2010, p. 1).

Further, some stakeholders did not support the program from its inception. Parents, teachers, and the teacher's union voiced concerns about students in the 12-14 age group being too immature to handle the laptops responsibly. These stakeholders were concerned that the laptops would negatively influence the students by distracting them from their schoolwork (Onuoha et al., 2016). Additionally, it has been reported that stakeholders in the educational community regarded the initiative as an implementation

failure (Briggs & Blair, 2016; Onuoha et al., 2015, 2016). Students and teachers have attributed unsuccessful implementation of the initiative to theft and damage to the devices, poor technical infrastructure, lack of storage facilities at school, lack of technical support, teacher low self-affect, lack of training and professional development, and lack of knowledge of integrating the technology in the curriculum (Briggs & Blair, 2016; Onuoha et al., 2015, 2016). This study addressed the factors that affected the implementation of this initiative from the perspective of the secondary school principals as change facilitators.

## Background

Teachers may be considered as implementers of change in the 21st century classroom. In this role, they have an opportunity to educate a generation of students who have been born and raised in the Digital Age or, as some may call it, the Knowledge Age (Tan, 2010, p. 896). Commonly known as digital natives (Phillip et al., 2017; Starkey et al., 2017), the net generation (Oblinger & Oblinger, 2005; Oblinger et al., 2005; Tapscott, 2009), or millennials (Oblinger, 2003), today's student body comprise a generation of learners who use smart devices to access much of their personal, social, entertainment, and academic needs. The 21st century classroom environment, therefore, should provide an atmosphere of learning and instruction as well as a curriculum that could equip learners with the lifelong skills for employment in a digitally driven marketplace.

Computers and the Internet are so prevalent that Siemens (2006) proposed a new theory of learning called connectivism. Connectivism is based on the notion that

knowledge is dynamic. Siemens suggested that in the age of the Internet, individuals acquire knowledge from networks of friends, family, and experts who constitute online connections. The social networking site, Facebook, and the business networking site, LinkedIn, exemplify Siemens' theory of acquiring knowledge from connecting with networks or social groups. Facebook users share newsworthy events at home and abroad. LinkedIn users also access a variety of articles from experts and share job opportunities on a global level.

Mayer's (2009) theory of multimedia learning also supports the use of computer technology to support learning. The theory suggests presenting content using words and pictures so that individuals can better grasp knowledge. Mayer concluded that computer technology enhances and supports learning in ways that were not previously possible.

Prior to these modern theories of learning, constructivist learning theories supported, "problem solving, reasoning, critical thinking, and the active and reflective use of knowledge" (Driscoll, 2005, p. 393). Some school systems have been seeking ways to integrate computer technology in the process of teaching and learning to achieve such learning goals. Although Tamim et al. (2011) found no conclusive evidence that integrating technology in the classroom has a significant effect on academic achievement, various school systems and educators have been determined to integrate laptops in learning. Some educators use computer technology in their pedagogical process to enthrall, excite, and empower students to take ownership of their learning. These teachers use computer technology in the classroom to teach their students to seek, synthesize, and

produce knowledge. They use the technology to help their learners develop higher order critical thinking skills, problem-solving skills, communication skills, and collaborative learning skills (Cennamo et al., 2009; Leu et al., 2004; Simkins et al., 2002).

Computer technology can also be used to differentiate learning and facilitate an inclusive learner-centered classroom environment, inviting learners of diverse cultural and linguistic backgrounds and learning styles to share in fair and equal access to classroom content (Bray et al., 2004; CAST, 2018; Sailer et al., 2021; Tomlinson & McTighe, 2006). Integrating computer technology in the classroom could support building a generation of learners equipped with the understanding, knowledge, and skills to form the backbone of a technology-driven society. Accordingly, computing initiatives have become widespread as decision-makers seek to enhance academic achievement, increase student motivation, develop more learner-centered classroom environments, encourage teachers to adopt 21st century instructional strategies, bridge a socioeconomic digital divide, and ultimately influence a more digitally connected and globally competitive society (Baker, 2000; Bebell et al., 2010; Blackley & Walker, 2015; MoE, 2010; Sailer et al., 2021; Turgut, 2012; Valiente, 2010; Warschauer et al., 2014). These programs, however, are quite costly and sometimes do not realize the intended results (Topper & Lancaster, 2013).

One to one laptop programs, also called one-to-one computing, ubiquitous computing, or 1:1 computing initiatives, involve providing one laptop to each child in a participating class, school, or district (Cole & Sauers, 2018; Islam & Grönlund, 2016;

Laronde et al., 2017; Penuel, 2006; Valiente, 2010; Warschauer et al., 2014). Penuel's

(2006) review stated that 1:1 computing programs must include the following

characteristics:

- providing students with use of portable laptop computers loaded with

  contemporary productivity software (e.g., word processing tools,

  spreadsheet tools, etc.),

- enabling students to access the Internet through schools' wireless

  networks, and

- using laptops to help complete academic tasks such as homework

  assignments, tests, and presentations (p. 331).

Islam and Grönlund (2016) broadened this definition to include tablets and handheld

devices (p. 192). Cole and Sauers (2018) "consider schools that provide every student

with a computing device to be 1:1 schools" (p. 201).

Apple Classrooms of Tomorrow may have been the first 1:1 initiative. The project

was launched in 1985 and by the following year, teachers and students in five public

schools were provided with computers (Baker et al., 1990; Dwyer et al., 1994;

Richardson et al., 2013). One to one computing was introduced in schools in China by the

late 1990s (Gu et al., 2013). Around the same time, some countries in the Commonwealth

Caribbean began to establish a foundation to introduce information and communications

technology (ICT) in education.

There were approximately 1000 schools in the U.S. implementing 1:1 programs in 2000 (Dunleavey et al., 2007). The one-laptop-per-child (OLPC) project was introduced in 2004-2005 with the mission of equipping students in developing countries with a cost-effective, durable laptop (James, 2010; Richardson et al., 2013; Roberts & Zamora, 2012). To date the program has distributed more than 3 million laptops to students and educators, fulfilling its mission of empowering children by giving them access to technology (map, n.d.). Two more initiatives from Intel and the government in India followed OLPC's model and mission of providing laptops for students in developing nations (Richardson et al, 2013). Microsoft's Anytime Anywhere Learning program allowed students and teachers in the U.S. to purchase or lease laptops for educational use (Penuel, 2006).

Australia's "Digital Revolution" took place in 2007 (Blackley & Walker, 2015, p. 99), although research has dated a 1:1 initiative in Australia to a women's Methodist College as early as 1989 (Richardson et al, 2013). It is evident that 1:1 programs have become a worldwide trend. The Organization for Economic Co-operation and Development advocates for the integration of ICT in the practice of teaching and learning due to, "the perceived needs of the economy and the fact that most companies require personnel with ICT skills" (Ndiritu et al., 2018, p. 27).

Research, however, indicates that leaders and decision-makers in the field of education have been investing large sums of money to support ICT in schools with little or no evidence of the impact of technology on student engagement, academic

achievement, and learning and instruction (Bebell & O'Dwyer, 2010; Bebell et al., 2010; Weston & Bain, 2010). Hew and Brush (2007) reported that U.S. school districts invested $7.87 billion on technology in education in the 2003-2004 academic year. The authors also noted that the government of Singapore invested about $1.2 billion to launch their Master Plan for Information Technology in Education (Hew & Brush, 2007, p. 224). The government of Kenya invested a lot of money to integrate ICT in their education system, dedicating an entire ministry to this cause (Ndiritu et al., 2018). The government of the Republic of Trinidad and Tobago (GoRTT) spent $83 million dollars to provide laptops for students, teachers, and administrators, and training to prepare teachers to implement the eCAL 1:1 laptop initiative (Severin & Capota, 2011).

Major stakeholders in the educational community of Trinidad and Tobago, including the Ministry of Education (MoE), favored the integration of computers in the public school system to equip students with technical knowledge and employable skills (MoE, 2005; Phillip, 2008; Severin & Capota, 2011; UNESCO, 2007). In May 2010, the government of the Republic of Trinidad and Tobago (GoRTT) launched the eCAL 1:1 laptop program (Briggs & Blair, 2016; MoE, 2010; Onuoha et al., 2015; Trinidad and Tobago Computer Society, 2010). Under this initiative, laptops were provided to all students who passed the Secondary Entrance Assessment (SEA) examination.

Although the government has invested large sums of money on the initiative, a review of the literature regarding the eCAL 1:1 initiative suggested that implementation of the program was less than successful due to limited integration of the technology in the

secondary school curriculum. Harry and Mitchell's (2015) research on the eCAL

initiative indicated that some teachers believe that the program could be beneficial for the

students. However, other research showed that teachers do not favor using laptops in the

classroom due to their lack of knowledge and training regarding how to use the laptops in

the practice of learning and instruction. The teachers also found the laptops to be

distracting to the students, therefore limiting the time teachers had for lessons. The

teachers had to re-engage and closely monitor their students and encourage them to stay

on task and avoid social media. Teachers also complained about time spent

troubleshooting and trying to fix faulty hardware, a lack of technical infrastructure in

schools, lack of space to store the laptops, and a lack of technical and administrative

support (Augustine, 2015; Briggs & Blair, 2016; Jennings, 2017; Onuoha et al, 2015;

Onuoha et al., 2016). Most of the studies explored the implementation of the eCAL

program from the perspectives of the teachers. There is a lack of literature, however,

concerning the experiences and impressions of school leadership regarding the factors

that affected the implementation of the laptop technology under the eCAL 1:1 initiative.

### Research Problem

GoRTT's goal was for technology to be integrated into the curriculum in schools

in Trinidad and Tobago to teach students critical, lifelong skills that would make them

more employable and promote a more technology savvy culture (MoE, 2005; Phillip,

2008; Severin & Capota, 2011; UNESCO, 2007). Researchers have shown that some

governments and administrations make decisions to launch costly one-to-one initiatives

with little or no data to support the goal of enhancing teaching and learning (Bebell &

O'Dwyer, 2010; Bebell et al., 2010; Goodwin, 2011; Means, 2010; Phillip, 2007;

Valiente, 2010). The government of Trinidad and Tobago is no exception (Philip, 2007).

GoRTT provided 54,329 laptops and some training for 7,734 teachers over the 2010-2013

fiscal period to support the national 1:1 initiative (Ministry of Finance and the Economy,

2015). The government spent $83 million USD on the initiative (Severin & Capota,

2011) with the aim that the laptops would be used across all disciplines (Briggs & Blair,

2016).

Although a large sum of money was spent to provide the necessary resources and

training to launch the eCAL initiative, research indicates that there was limited

integration of the laptop technology, and that implementation of the initiative was less

than successful (Briggs & Blair, 2016; Jaikaran-Doe et al., 2016; Onuoha et al., 2015,

2016). This finding gives rise to the question of what were the reasons for limited

integration of the laptops under the eCAL initiative. The literature provided some data

concerning the experiences when implementing the eCAL initiative from the perspective

of secondary school teachers. However, there was a gap in the literature regarding what

factors affected implementation of the 1:1 initiative from the perspective of the secondary

school principals. Hew and Brush (2007) identified a gap in the literature regarding

integrating technology in K12 classrooms concerning factors that may affect

implementing these initiatives at the school or district level (p. 247). Exploring the

elements that affected the implementation of the eCAL initiative from the principals'

point of view shed light on factors that affected integration of the laptop technology at the school level.

## Purpose Statement

The purpose of this basic qualitative study was to explore and gain a better understanding of what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative from the perspective of secondary school principals in Trinidad and Tobago. The findings of this study could provide information to support the educational community in the successful implementation and integration of ICT in education in secondary school classrooms in Trinidad and Tobago. In addition, the findings of this study could also inform the practice and process of implementing and integrating ICT in secondary school classrooms in similar educational contexts.

This study could provide much needed knowledge concerning secondary school principals' perspectives of integrating laptops in the classroom, what supports and barriers, if any, exist when integrating laptops in the secondary school curriculum, and what strategies might best mitigate potential barriers. Such data could inform GoRTT, stakeholders, and policy and decision-makers regarding what could be done to support effective integration of computing devices in the process of teaching and learning in the secondary school curriculum. The knowledge provided by the study could also address a lack of current data to support decisions regarding policy and change in the public-school system in Trinidad and Tobago (Means, 2010; Phillip, 2007).

**Research Question**

The central research question for the study was:

- From the perspective of the secondary school principals, what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative?

**Conceptual Framework**

This study was framed within Hall and Hord's (2015) six functions of change facilitators for effective implementation of change. This study considered the principal to be a school leader and change facilitator. Hall and Hord's essential functions of the successful change facilitator are as follows:

- Developing, articulating, and communicating a shared vision of the intended change

- Planning and providing resources

- Investing in professional learning

- Checking progress

- Providing continuous assistance, and

- Creating a context supportive of change (pp. 31-34)

Hall and Hord (2015) explained that "[t]hese six Functions were deemed necessary for change to happen" (p. 31). Hall and Hord reasoned that the first step to enacting change is that the change facilitator must clearly communicate the vision to the implementers of the change. For this study, I considered the change facilitators to be the

principals and the change implementer to be the teachers. It is essential that the vision is comprehensive and communicated on a consistent and continuous basis. The vision must become a shared vision (Hall & Hord, 2015; Oliver & Townsend, 2013). Following this function, change facilitators must have set policies and procedures for implementing the change and provide the necessary resources to enable successful implementation of the change. It is important for the change facilitator to understand that planning and providing resources is a dynamic function in that policies may need to be altered or updated and additional resources may be needed as the implementation progresses (Hall & Hord, 2015).

Another essential function is that the change facilitator should be able and willing to provide the appropriate training and professional development to equip the change implementers with the understanding, knowledge, and skills to implement the change effectively and successfully (Hall & Hord, 2015; Oliver & Townsend, 2013). The change facilitator must put a system of formative checks in place to assess and troubleshoot any issues that may arise for the change implementers as they progress. The change facilitator must also provide constant guidance and support as a leader and continuously assist the change implementers as needed. Finally, the change facilitator must create a school culture and environment that is conducive and welcoming to change not just in terms of attitudes and behavior, but also in terms of physical infrastructure and support staff (Hall & Hord, 2015).

**Nature of the Study**

This study used a basic qualitative research design. Merriam and Tisdell (2016) explained that the basic qualitative inquiry may be the most commonly used approach in the applied disciplines such as education (p. 23). This type of research is best suited to studies that intend to explore a phenomenon for the benefit of adding to the body of knowledge about a particular topic, yet the research could also influence further research, the development of interventions, educational practices, and theory (Given, 2008; Kennedy, 2016; Patton, 2015; Salkind, 2007). This study aimed to add to the body of knowledge regarding technology integration by exploring the implementation of the national eCAL 1:1 laptop initiative from the perspective of the secondary school principal.

Data was collected from in-depth interviews of secondary school principals and documents pertaining to the eCAL 1:1 initiative. The perspectives of the teachers or students were not considered, as the study defined the principal as a leader and change facilitator. For the purpose of this study, the implementation of the initiative was explored from the leadership perspective of the secondary school principal and did not include the perspective of a school district leader or any other major stakeholder or decision-maker. Each interviewee received the same set of questions. The data was analyzed using thematic analysis. Thematic analysis "is a method for identifying, analyzing, and interpreting patterns of meaning ['themes'] within qualitative data" (Clarke & Braun, 2017, p. 297). In this study, the responses of each participant were

coded, compared, and analyzed for common themes. A report on the process of implementing the eCAL initiative from the perspective of the secondary school principals was then constructed.

## Definitions

- *1:1 laptop program:* A program in which each student in a particular class, grade, school, or district is provided with a laptop for use in the classroom and at home (Valiente, 2010; Warschauer et al., 2014).

- *Information and Communication Technology (ICT):* "All technological gadgets which include but not limited to computers and the internet used to communicate, create, manage, store and disseminate information" (Mwadulo & Odoyo, 2020, p.1).

- *ICT Integration:* "The use of technology as [an] instructional tool in curriculum delivery" (van Niekerk & Blignaut, 2014, p. 237).

- *Technology integration: "*The effective implementation of educational technology to accomplish intended learning outcomes" (Davies & West, 2014, p. 6).

- *ICT implementation:* Effective integration of ICT into the practice of learning and instruction for: "sustainable, long-term, schoolwide use" (Davies, 2010, p. 58).

- *Technology leadership:* "Interaction between members within an institution that are necessary for generating systems for the use of ICT in schools" (Davies, 2010, p. 58).

- *Change facilitator:* An individual who facilitates the implementation of change in a school (Hall, 1982).

- *Change implementer:* An individual who implements change in a school (Hall, 1982)

## Assumptions

For this study, it was assumed that the eCAL initiative was an implementation failure and that there was low integration of the laptops in the curriculum based on prior research on the eCAL initiative (Briggs & Blair, 2016; Jaikaran-Doe et al., 2016; Onuoha et al., 2015, 2016). This assumption was crucial to the study as it was my intent to seek information about the challenges that occurred during implementation. It was also my intent to discover how these challenges could be overcome to ensure that future attempts were more successful at integrating ICT in the education system of Trinidad and Tobago. It was assumed that the secondary school principals were facilitating the implementation of the laptop program in their schools and that the teachers were implementing the change. This was another critical assumption since principals were considered as leaders of change and were interviewed in this capacity. It was also assumed that the principals would be truthful in relating what occurred during implementation of the eCAL initiative and that they were knowledgeable regarding strategies for successful program

implementation. Finally, based on a review of the literature, it was assumed that effective integration of laptops in the curriculum would enhance the practice of teaching and learning in Trinidad and Tobago, support the growth of a technology-driven society, and positively affect the welfare of society in the long term.

## Scope and Delimitations

This study focused on exploring the experiences and impressions of the secondary school principals as school leaders and their involvement with implementing the eCAL laptop initiative. This study proposed to fill a gap in the literature and add to the body of knowledge on the topic of ICT integration in the process of learning and instruction in K12 educational contexts. The study did not focus on the teachers' involvement since the studies that had been conducted on the eCAL laptop program focused on the secondary school teachers who were involved in implementing the program (Briggs & Blair, 2016; Jaikaran-Doe et al., 2016; Onuoha et al., 2015, 2016).

Principals and vice-principals of the secondary schools who participated in the eCAL program were included in the study. Stakeholders such as politicians, entrepreneurs, parents, and other school staff and administration were excluded. These individuals may be essential to the change process, but the principal is the leader of the school and is directly responsible for facilitating the implementation of the change at their respective schools. Students were also excluded as the study only included adult participants. The principals provided vital information that could be shared with schools

and districts throughout the Caribbean, South America, and similar educational communities as they seek to successfully implement 1:1 laptop initiatives.

## Limitations

One potential limitation was the use of email interviews as the data retrieval method. Valuable data, which could only be retrieved from using a face-to-face method, such as non-verbal cues, were missed. The e-mail process was also lengthy and there was a risk of losing participants, thereby potentially weakening the credibility, transferability, confirmability, and dependability of the study (Meho, 2006). This limitation was mitigated by informing the participants of time constraints in initial emails and sending reminder emails when necessary. The email format was also more suitable for International participants, as these individuals had the time and convenience of being able to review the questions and provide the kind of in-depth, thoughtful answers that may not have occurred when having to provide immediate responses.

## Significance

Research indicated a concern that stakeholders are making decisions about policy and change regarding ICT in education that involved sizeable investments of money and resources without the support of data (Means, 2010; Phillip, 2008). This study provided valuable data from the viewpoint of secondary school principals who were key figures when driving change in the education system. The majority of current literature on the topic of technology integration and implementation of the eCAL 1:1 laptop program provided data about the challenges encountered when implementing the initiative from

the perspective of the teachers. There was a lack of literature and therefore a gap in the knowledge of the implementation of the 1:1 program from the perspective of the principal as a school leader and facilitator of change. This study was significant in that it intended to partially fill this gap in the knowledge regarding ICT integration and implementation in the education system of Trinidad and Tobago, neighboring countries in the Caribbean and South America, and in similar educational contexts worldwide.

Hall et al. (1982) identified the principal as "a critical variable in bringing about school change" (p. 4). Hall et al. (1982) continued to label the school principal as the "gate-keeper of change" (p. 5). These descriptions identified the principal as a key figure in facilitating change. This study was significant as firsthand accounts of experiences implementing the eCAL 1:1 laptop initiative could be beneficial to stakeholders and decision makers in the educational community of Trinidad and Tobago at all levels of education and similar educational contexts worldwide.

This study was also significant in its commitment to positive social change. Walden's mission of change advocates for scholar-practitioners to be committed to positive social change (Walden University, 2018). This research contributed to Walden's mission for social change in its commitment to advancing the agenda of effectively integrating ICT in education to influence successful reform in the education system of Trinidad and Tobago. The government of this twin island nation had been slowly introducing computers in education since the late 1990s (George, 2015), and the eCAL 1:1 laptop initiative had been their largest scale effort to date. Supporting the success of

technology integration initiatives means support for national and international economic growth, social equality, and educational reform in the country. This research intended to influence the success of future attempts at technology integration, not only in Trinidad and Tobago, but in other Caribbean and South American countries. In so doing, I advocated for social and economic advancement, the promotion of academic achievement, and the development of the practice of teaching and learning.

**Summary**

Chapter 1 introduced the study and outlined the scope and direction of the study. The chapter also presented some background on the efforts to establish 1:1 computing programs on a district and international level. The background briefly traced the introduction of 1:1 laptop initiatives as countries attempted to implement change in their educational environment to enhance academic achievement and enhance the practice of teaching and learning. Chapter 1 established a gap in the current research on the topic of technology integration regarding implementation of the eCAL 1:1 government laptop program from the leadership perspective of the principal as a facilitator of change. Chapter 2 offers an extensive review of the literature on the topic of technology integration in Trinidad and Tobago and the gap that existed in the literature regarding the eCAL 1:1 government laptop program within Hall and Hord's (2015) conceptual framework of the six essential functions of the effective change facilitator.

Chapter 2: Literature Review

The purpose of this basic qualitative study was to explore and gain a better understanding of what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative from the perspective of secondary school principals in Trinidad and Tobago. The national initiative was launched with an expenditure of $83 million USD worth of capital (Severin & Capota, 2011) on resources and training. Also, it was the intent of the government that the laptops be used across the curriculum (Briggs & Blair, 2016; MoE. 2010). These factors made implementation of the initiative a priority (Schiller, 2002), yet implementation of the initiative seemed to be less than successful. The purpose of this basic qualitative study was to explore and gain a better understanding of what factors affected the implementation of the eCAL initiative from the perspective of the secondary school principals.

Most of the literature regarding technology integration in education is centered on the teacher (Fisher &Waller, 2013; Hew & Brush, 2007; Machado & Chung, 2015; Sailer et al, 2021; Schiller, 2002). There is a lack of research that explores the experiences and perspectives of the principal (Gonzales, 2019; Gonzales, 2020; Pautz & Sadera, 2017; Richardson & Sterrett, 2018; Schiller, 2002; Tan, 2010; van Niekerk & Blignaut, 2014; Yee, 2000). Schiller (2002) stated that, "There is a paucity of empirical research on the role of the principal in ICT implementation" (p. 290). Hew and Brush (2007) also suggested that there is a gap in the literature concerning "potential technology-related policies that exist at the school and district levels" (p. 247). Hew and Brush explained

that such studies could be valuable since decisions about implementing such policies are made at the school and district level. Mason (2007) reported specifically that no research was found on the impact of ICT integration in schools in the Caribbean on the process of teaching and learning. This study proposed to fill these gaps in that the study was focused on a 1:1 initiative that was implemented nationwide in the Caribbean country of Trinidad and Tobago. To date, the studies conducted on the eCAL policy feature what factors adversely affected integration of the laptop technology at the classroom level from the point of view of the students and secondary school teachers (Briggs & Blair, 2016; Harry & Mitchell, 2015; Jaikaran-Doe et al., 2016; Maharaj-Sharma & Sharma, 2017; Onuoha et al., 2015; Onuoha et al. 2016). It would be valuable to gather information from school leaders to identify what factors influenced integration of the eCAL policy at the school level. This chapter of the study will uncover what knowledge exists on the topic of the eCAL 1:1 initiative and the literature that explains the role of the principal when implementing change at the school level within the framework of Hall and Hord's (2015) six functions of successful change facilitators.

**Literature Search Strategy**

An extensive and exhaustive search was conducted to determine what knowledge currently exists on the topic of the eCAL initiative in Trinidad and Tobago as well as implementing 1:1 initiatives within the conceptual framework of Hall and Hord's (2015) six functions of effective change facilitators. The *Education Source* database was a starting point to find research in peer-reviewed journals. The list of databases and

journals also included *EBSCO, ProQuest Central, ERIC, SAGE journals,* and *Academic Search Complete*. After searching the available databases at the Walden University Library, a general search was conducted on the Internet. The following search terms were used to conduct electronic and web searches:

- eConnect and Learn Programme

- Technology Integration and School Principals

- Technology and School Leadership

- 1:1 Laptop Programs in Latin America and the Caribbean

- ICT Integration and Leadership

- The Role of the Principal when Implementing Change in Schools

## Conceptual Framework

**Principal as Facilitator of Change**

Hall (1982) identified the principal as a key essential to the change process in schools. The researcher proposed that principals could be categorized as managers, responders, or initiators, or any combination of the three. Schiller (1991) later proposed that principals play an essential role in implementing computers in education, arguing that implementation was most successful in schools in which the principal tended to be more of an initiator and least successful in schools in which the principal played the role of a responder (p. 48). Schiller (2002) investigated the role of the principal in ICT integration in 12 Australian primary schools from the perspective of the principals. These principals described their role as, "facilitator, helper, guide, mentor, coach, and

counsellor" (p. 294). Research indicates that the role of the principal is critical to accomplishing change (Anderson & Dexter, 2005; Gonzales, 2020; Hall, 1982; Sheninger, 2019). Hall (1982) also characterized the principal as a "gate keeper" (p. 7) who is key to facilitating change. Korumaz (2016) supported the description of the principal as 'gatekeeper' (p. 1) and added that principals as leaders are influential in inspiring their staff to achieve "organisational goals" (p. 1). Richardson et al. (2021) described principals as "leaders of digital learning" (p. 318) and Sheninger (2019) posited that principals as digital leaders need to act as an impetus for change in order to transform the school culture.

Bebell and O'Dwyer (2010) pointed out the importance of school leadership to the successful implementation of 1:1 initiatives. The authors examined four studies regarding middle school level 1:1 initiatives and discovered that, as the main ingredient in successfully integrating computers in the process of teaching and learning, teachers need supports such as professional development, on-going technical support, and encouragement and assistance from school leaders. The authors concluded that, "Overall, the studies presented here point to the need for preparing school leadership teams for the implementation of the 1:1 initiatives" (p. 10).

Research shows that principals must play a key role as technology leaders to facilitate successful implementation and integration of ICT in schools (Afshari et al., 2008, 2009; Anderson & Dexter, 2005; Chang, 2012; Claro et al., 2017; Flanagan & Jacobsen, 2003; Hsieh et al., 2014; Korumaz, 2016; Law et al., 2008; Pautz & Sadera,

2017; Prasojo et al., 2018; Richardson et al., 2021; Tan, 2010; van Niekerk & Blignaut, 2014). Hew and Brush (2007) suggested that leadership is an institutional barrier and contributing factor to unsuccessful technology integration in teachers' classroom practices. Fisher and Waller (2013) proposed that "In fact, lack of administrative support may be the most significant factor in a teacher choosing not to integrate technology" (p. 7). Claro et al. (2017) and Chang (2012) further suggested that the support of the principal is necessary for long-term adoption of ICT in education. Research also established a positive relationship between principal technology leadership and ICT integration into classroom practices (Thannimalai & Raman, 2018a; 2018b).

The role of the principal is, therefore, crucial to the change process and ICT integration in the school system. As such, any discussion about true reform and policy must consider the perspective of school leadership. This study intended to fill the gap in the literature and add to the body of knowledge concerning implementation of the eCAL initiative from the perspective of the principal. Harry and Mitchell's (2015) investigation of factors that facilitated the eCAL initiative identified the principal as a key factor in facilitating successful implementation of the initiative.

Hall and Hord have investigated the change process in organizations for the past 40 years after discovering a pattern of a lack of success when implementing change. The authors stated, "Many of these products and processes are discarded after a brief period of experimentation and no immediate or visible success" (Hall & Hord, 2015, p. 7). The current research on the CAL 1:1 initiative supports the idea that implementation of the

1:1 reform was less than successful and may have been discarded and replaced by another initiative. The researchers have suggested that there were six essential functions of change facilitators for effective implementation of change. In keeping with the identification of the principal as a change facilitator, this study intended to explore the factors that affected the implementation of the 1:1 initiative within the structure of the six essential functions.

Hall and Hord's (2015) research on implementing change in organizations revealed that principals have an essential, purposeful role in effecting change. The researchers explained that if principals, "do not engage in ongoing active support, it is more than likely that the change effort will cease" (Hall & Hord, 2015, p. 16). The researchers stated that administrators should be supportive, they should arrange continued opportunities for learning about the change and make the necessary resources and supports to facilitate adoption of the change available (Hall & Hord, 2015, p. 16).

Hall and Hord (2015) described the six functions of change facilitators as "the job description for change facilitators" (p. 31) and 'six sacred strategies' (p. 31). These essential functions are as follows:

1. Developing, articulating, and communicating a shared vision of the intended change

2. Planning and providing resources

3. Investing in professional learning

4. Checking progress

5. Providing continuous assistance

6. Creating a context supportive of change

Hall and Hord de these functions as having a continuous, cyclical relationship in that the functions feed into each other and are necessary for the process to continue. This study considered the principal to be the change facilitator concerning implementation of the eCAL 1:1 initiative in the secondary school system in Trinidad and Tobago.

Hall and Hord (2015) explained that it is first necessary for the principal to communicate a clear vision, not only of the initiative, but also of how the initiative could effectively and successfully affect the process of learning and instruction. Hall and Hord implied that implementation failure is a result of not sharing this vision of change. The researchers suggested that change facilitators illustrate the vision of change using an Innovation Configuration (IC) Map to demonstrate important elements and aspects of the change. Hall and Hord advised that communication of the vision of change should be on going as there may be adjustments to the vision as the initiative is being implemented. In addition, change facilitators should use various means of communication so that the vision is widely shared and always accessible to encourage stakeholder buy-in.

When implementing change, facilitators need to provide the necessary resources to set up, support, and sustain the change. Hall and Hord (2015) advanced the idea that a lack of planning and provision of resources is a contributing factor to unsuccessful implementation of change initiatives. This function is also an ongoing process as adjustments must be made to provisions and planning as the vision of change updates.

Hall and Hord suggested that principals use Stages of Concern (SoC) and Levels of Use (LoU) questionnaires to determine teachers' feelings about the initiative and confidence levels regarding implementing the initiative.

Hall and Hord (2015) cited learning "as the basis of and corollary to change" (p. 33). Principals need to provide ongoing opportunities for teachers to train in order to integrate the laptops effectively in their classroom process when implementing a 1:1 initiative. For implementation to be successful, principals need to support ongoing professional development opportunities for their staff. Hall and Hord (2015) advised that ongoing professional learning be structured as follows:

- Scheduling learning and development sessions across time

- Identifying and contracting with consultants

- Providing information about the change

- Teaching the skills required of the innovation

- Developing positive attitudes about use of the new program

- Holding workshops

- Modeling and demonstrating innovation use

- Clarifying misconceptions about the program or practice. (p. 33)

Hall and Hord suggested that professional learning opportunities be "concerns-based and focused on the vision for the change" (p. 33).

Facilitating implementation of successful change must involve plans to continuously monitor progress or a lack of progress. Hall and Hord (2015) proposed that

principals conduct One-Legged Interviews to determine teachers' needs and concerns, answer questions, and troubleshoot issues. Conducting these interviews send a clear signal to the teachers of support from their administration, thereby encouraging adoption of the initiative. Hall and Hord (2015) list additional means of checking progress as follows:

- Collecting information about teachers' developing knowledge and skills

- Collecting and providing feedback at the end of workshops

- Talking informally with teachers about their progress

- Systematically measuring, analyzing, and interpreting SoC, LoU, and IC on a regular basis. (p. 34)

Providing continuous assistance to teachers and creating an environment that supports change are the final functions of principals who are successful change facilitators. Principals who are easily accessible, willing, and able to help with problem-solving, who encourage use of the initiative, and provide the necessary technical and staff support display characteristics consistent with the functions of providing continuous assistance and creating a supportive environment for change. Such contexts encourage teachers and other stakeholders in the learning community to implement and adopt change.

**Review of the Literature Related to Conceptual Framework**

Hall and Hord's (2015) characteristics of successful change facilitators echo the findings of Yee's (2000) investigation of the role of the principal as technology leader in

ten elementary and middle schools in New Zealand, Canada, and the United States. The principals in Yee's (2000) study suggested that in order to be effective leaders, principals should develop and share their vision for ICT implementation; render easy accessibility to high quality software and hardware; provide ongoing technical, administrative, and professional support; provide ample opportunities for hands-on training and professional development for staff; and seek professional development to acquire digital literacies (pp. 298-299). Apsorn et al.'s (2019) study of the impressions of secondary school principals in Thailand regarding ICT in education corroborated Yee's (2000) findings, adding that "As leaders in the use of modern technology, administrators should work to satisfy the needs for continuous educational change" (p. 647).

Schiller's (2002) study of the role of the principal in ICT implementation in 12 elementary schools in Australia concluded that the principal must be an effective change facilitator to increase the likelihood of successful ICT implementation (Apsorn et al., 2019). The principals in the study facilitated ICT implementation in their schools by "modelling, coaching, monitoring, collaboration, and visioning, combined with an expectation that teachers would implement ICT in their classrooms" (p. 296). The administrator in Laronde et al.'s (2017) case study provided support for the teachers and students in terms of sharing a vision, planning, providing ongoing professional development and technical support. These characteristics align with Hall and Hord's (2015) functions of an effective change facilitator.

Qualitative data from Claro et al.'s (2017) study regarding ICT integration in 3 public schools in Chile indicated that the intervention would have been more successful if there was effective, ongoing support from the principals. Hall and Hord (2015) identified continuous support from leadership as one of the six essential functions of the successful change facilitator. Research corroborates that the support provided by principals is necessary for successful implementation and integration of ICT in education (Afshari et al., 2008, 2009; Christensen et al., 2018; Esplin et al., 2018; Gonzales, 2019; Hughes et al., 2016; Milman, 2020; Prasojo et al., 2018 Raman et al., 2019; Richardson et al., 2021; Sterrett & Richardson, 2020a, 2020b; Torrato et al., 2021; Uğur & Koç, 2019). Cole and Sauers (2018) listed professional development, principal leadership, and a shared and articulated vision of change as essential factors for successful implementation of 1:1 programs and included poor planning and ineffective leadership among the barriers to successful implementation.

Research indicates that to successfully facilitate the implementation and integration of ICT in schools, principals need to have and share their vision for the implementation and integration of technology in the process of learning and instruction (Afshari et al., 2008, 2009; Apsorn et al., 2019; Baker et al., 2020; Blau & Shamir-Inbal, 2017; Christensen et al., 2018; Claro et al., 2017; Dexter & Richardson, 2020; Dexter et al., 2016; Francom, 2020; Gonzales & Jackson, 2020; Islam & Grönlund, 2016; Milman, 2020; Pautz & Sadera, 2017; Tondeur et al., 2017; Uğur & Koç, 2019). Sheninger (2019) and Gonzales (2020) agreed with Hall and Hord (2015) that principals as digital leaders

need to develop a clear vision of change, model technology use, and support a culture of change in order to effect sustainable transformation in their schools.

Research also indicates that principals as technology leaders should create a culture of change to facilitate successful implementation and integration of ICT in schools (Afshari et al., 2008, 2009; Chernoff, 2018; Islam & Grönlund, 2016; Korumaz, 2016; Ossiannilsson (2018); Petterrson, 2018a, 2018b; Prasojo et al., 2018; Richardson et al., 2021; Sheninger, 2019; Sterrett & Richardson, 2020a, 2020b; Uğur & Koç, 2019). Chernoff (2018) noted that the failure of administrators to create a culture of change that encourages teachers to transform their teaching style is "One of the weakest areas of any one-to-one initiative" (pp. 155-156).

Project RED (Revolutionizing EDucation) was formed with the goal of helping schools successfully implement 1:1 computing initiatives (Hayes & Greaves, 2013). After surveying 1000 schools in the U.S., the researchers discovered that technology integration in education could promote academic achievement and create a blueprint for schools to model successful integration of 1:1 initiatives. Project RED proposed "Nine Key Implementation Factors (KIFS)" (Hayes & Greaves, 2013, p. 28) for success 1:1 implementation. KIFS 2 and 9 read as follows:

- Change management leadership by principal: Leaders provide time for teacher professional learning and collaboration at least monthly.
- Principal training: Principals are trained in teacher-buy-in, best practices, and technology-transformed learning. (Hayes & Greaves, 2013, p. 28).

Project RED concluded that strong leadership, focused on facilitating a culture of change, is key to the successful implementation of a technology initiative. The researchers also advocated that successful implementation starts with careful planning. Project RED's model for successfully implementing 1:1 initiatives aligns with Hall and Hord's (2015) suggestion that successful change facilitators should create a context supportive of change.

Oliver et al. (2012) concurred that successful implementation of 1:1 initiatives are supported by effective leadership, planning, communicating the vision to obtain stakeholders' buy-in, and providing resources in terms of equipment and support personnel, and training (Apsorn et al., 2019; Chang, 2012; Christensen et al., 2018; Fisher & Waller, 2013; Gürfidan & Koç, 2016; Islam & Grönlund, 2016; Mcleod & Richardson, 2013; Mwadulo & Odoyo, 2020; Ndiritu et al., 2018; Thannimalai & Raman, 2018b; Uğur & Koç, 2019). The researchers' interviews of principals from 18 middle and high schools in the state of North Carolina revealed that the principal plays a key role in facilitating the successful implementation of 1:1 computing initiatives. Oliver et al. (2012) suggested that principals should be willing to assume the roles of "learner, motivator/change agent, technician, instructional leader, purveyor of resources, and evaluator" (p. 125), for such programs to succeed.

Chang (2012) made a clear distinction between traditional leadership and technological leadership claiming that the latter involves specific functions that must be acquired (Brown & Jacobsen, 2016; Dexter & Richardson, 2020; Richardson & Sterrett,

2018). Chang's findings regarding effective technological leadership aligns with Hall and Hord's functions of the effective change facilitator, Chang proposed that principals as effective technological leaders should:

1. Develop and implement vision and technology plans

2. Encourage teacher technological development and training

3. Provide sufficient technological infrastructure

4. Provide ongoing support

5. Develop an effective evaluation plan

Create an environment for change by embracing change. (pp. 336-337). Fisher and Waller (2013) found that "a positive correlation exists between principal technology leadership and teachers' technology-related teaching practices" (p. 24). Their study involving 328 principals and 303,950 teachers indicated that it is imperative that principals become technology literate to lead and facilitate successful ICT implementation and integration (Akcil et al., 2019). Wei et al.'s (2017) research involving Malaysian secondary school teachers found that there was a positive correlation between principal technology leadership practice and teacher ICT competency. The findings of Ismail et al. (2021) and Francisco (2019) established a relationship between principals' technology leadership and teacher self-efficacy. It has been determined that when principals model effective technology use, teachers may be more likely to adopt these practices in the classroom thereby promoting the opportunity for successful ICT integration in education. Principals need to become digital learners to

become effective digital leaders (Francisco, 2019; Gonzales, 2020; Ibrahim et al., 2018; Ismail et al., 2021; Mårell-Olsson & Bergström, 2018; Ogunshola & Adeniyi, 2017; Sheninger, 2019; Torrato et al., 2021). In contrast, Raman et al.'s (2019) study involving Malaysian secondary school principals and teachers in the norther region of Kedah found no significant relationship between principal's technology leadership and teacher's technology integration. However, the researchers did support the claim that principals need specific professional development and training focused on ICT integration and increasing self-efficacy to become effective technology leaders.

Pautz et al. (2015) credited the successful implementation of 1:1 initiatives to effective leadership. From their study of implementing 1:1 initiatives at two elementary schools, the researchers discovered that the principals of both schools articulated a clear vision of their goals for creating learner-centered environments and of equipping students with 21st century learning skills once the 1:1 initiatives were successfully implemented. The principals used social media, print, and electronic resources to create awareness and obtain the buy-in of stakeholders in the learning community. The researchers described how these principals created a culture of change in their schools prior to introducing the initiatives. The principals further supported this change environment by facilitating ongoing professional development and making provisions for teachers to track the effects of implementing the 1:1 programs on student achievement. The principals provided continuous assistance by creating a supportive environment and providing networking opportunities for their teaching staff. Finally, incentives were provided to encourage the

teachers to adopt the 1:1 initiatives. The principals in Pautz et al.'s (2015) study exhibited the six functions of effective change facilitators, resulting in successful implementation of their 1:1 initiatives.

In similar fashion, Keane and Keane's (2017) study pinpointed principal leadership as an essential element of ICT integration in schools (p. 1039). The longitudinal study used a mixed methodology to explore the perspectives of the teachers and students regarding implementation of a 1:1 program throughout a secondary school in Australia. Three of the groups in the study experienced successful program implementation while one was less than successful, and another was unsuccessful. Findings determined that a lack of a school wide vision was a factor of unsuccessful implementation of the 1:1 program. Gürfidan and Koç (2016) agreed that administrators must have a shared vision and create an environment that is supportive of change in order to facilitate effective, sustainable, and successful integration of technology into educational practice (Machado & Chung, 2015; Francom, 2020; Sheninger, 2019; Thannimalai & Raman, 2018b).

Regarding technology integration, Ossiannilsson (2018) stated that "The tasks of leaders now are to foster its successful implementation and to empower the institutional culture by initiating sustainable changes" (p. 134). Tarman et al.'s (2019) survey of 137 Turkish social studies teachers identified a lack of administrative support as one of the barriers to technology integration. Correspondingly, Harper and Milman's (2016) review of the literature concerning 1:1 technology in schools highlighted the necessity for school

administrators to provide appropriate levels of technical support and to be willing to adjust their plans for ICT integration in order to facilitate successful implementation of 1:1 initiatives. Findings of Kotok and Kryst's (2017) case study of a high school principal in rural Pennsylvania, USA, attributed successful technology integration to the principal's unwavering vision and determination to adjust plans to mitigate each new challenge.

Research indicates that principals are also responsible for planning and informing policies to guide technology use in schools (Brown, 2021; Sauers & Richardson, 2019; Torrato et al., 2021). Sauers and Richardson's (2019) study of 75 1:1 U.S. school districts added that, in order to facilitate successful 1:1 initiatives, it is necessary for principals to develop and establish Acceptable Use Policies (AUPs) or Responsible Use Policies (RUPs) to govern students' use of technology in schools (p. 27). Planning and providing resources such as these policies helps to create a context supportive of change and supports Hall and Hord's (2015) assertions that these functions are essential to facilitate successful change.

These studies support Hall and Hord's (2015) ideas that the role of the principal in implementing a 1:1 initiative is to create and cultivate an environment and culture of change and should begin with a vision of the change (Dexter & Richardson, 2020; Dexter et al., 2016). In contrast, Machado and Chung's (2015) interviews of four principals from four school districts in Northern California revealed that although the principals could see a need for technology integration, none of them had a plan or even considered that they have a pivotal role in the process. The principals cited lack of teacher training and

development, a lack of willingness to use the technology and a lack of support from the district as barriers to integrating technology.

The principals in Leonard and Leonard's (2006) study also attributed teachers' unwillingness to integrate technology in the curriculum to unsuccessful implementation of technology initiatives. Leonard and Leonard's exploration of technology integration in 149 schools in the state of Louisiana explored the perspectives of 214 school principals. The researchers suggested that inadequate funding, lack of training for teachers, poor software and hardware, lack of equipment maintenance, and a high level of low self-efficacy among principals and vice-principals regarding technology use and leading technology integration were contributing factors to unsuccessful implementation of 1:1 initiatives (Leonard & Leonard, 2006, p. 221).

Research shows that principal self-affect influences teacher self-affect and promotes the success of initiatives that improve the practice of learning and instruction (Akcil et al., 2019; Versland & Erickson, 2017). Research also indicates that a principal's level of self-affect regarding technology affects teachers' ICT integration in the classroom (Afshari et al., 2009; van Niekerk & Blignaut, 2014). Researchers acknowledge that principals need to have greater self-affect to be effective technology leaders (Al-Harthi, 2017; Fisher & Waller, 2013; Flanagan & Jacobsen, 2003). Al-Harthi's (2017) mixed methods study of self-affect and technology concerning educators in a technology leadership training program at a university in Oman revealed that "Having high technological self-efficacy is expected to translate into technology

leadership at schools. This, in turn, is expected to impact student achievement and teacher

performance" (p. 770). Vongkulluksn et al. (2018) added that administrators need to

acknowledge and encourage teachers to develop positive value beliefs toward technology

to mitigate teachers' perceptions of external barriers to technology integration (p. 79).

Ibrahim et al. (2018) suggested that the administrator's attitude is critical when

facilitating ICT integration in education. Öznacar and Dericioğlu's (2017)

phenomenological study about challenges to ICT integration faced by high school

administrators in North Cyprus aligns with these findings. The researchers illustrated that

while the administrators had the knowledge, skills, and willingness to use technology,

"due to certain inadequacies and obstacles they fail to do so" (p. 267) and are

apprehensive about using technology effectively.

Principals need to become more technology literate and knowledgeable about ICT

integration to support and motivate their teacher professionals and to facilitate successful

integration of ICT in their schools (Afshari et al., 2009; Akcil et al., 2019; Anderson &

Dexter, 2000; Antonio & Lorenzo, 2019; Asio & Bayucca, 2021; Brown & Jacobsen,

2016; Chang, 2012; Christensen et al., 2018; Dexter & Richardson, 2020; Dexter et al.,

2016; Esplin et al., 2018; Fisher & Waller, 2013; Flanagan & Jacobsen, 2003; Hsieh et

al., 2014; Håkansson Lindqvist, 2019; Håkansson Lindqvist & Pettersson, 2019; Kotok &

Kryst (2017); Ndiritu et al., 2018; Pautz & Sadera, 2017; Shepherd & Taylor, 2019;

Thannimalai & Raman, 2018a; Thannimalai & Raman, 2018b; van Niekerk & Blignaut,

2014; Versland & Erickson, 2017). Antonio and Lorenzo (2019) explained that it is

essential for administrators to be digitally literate for successful ICT integration in schools. The researchers opined that it is unlikely that administrators who do not use technology will encourage teachers to integrate ICT in their practice.

Håkansson Lindqvist's (2019) study of the implementation of 1:1 laptop initiatives in two schools in Sweden established "the need for systematic professional development" (p. 1237) for school leaders. Håkansson Lindqvist and Pettersson (2019) explored the journals of 32 school leaders in Sweden and interviewed eight of these principals. In addition to echoing the need for professional development, they maintained that principals should be digitally competent to lead and support digitalization in schools.

Yamamoto and Yamaguchi (2019) established that there was a positive relationship between transformational leadership and ICT integration in schools in Mongolia. Francisco (2019) also established a positive relationship between transformational leadership and teachers' self-efficacy. Researchers associate transformational leadership with developing and communicating a vision, planning and supporting technology integration, and motivating and inspiring staff (Antonopoulou et al., 2021; Baker et al., 2020; Kouni et al., 2018). Antonopoulou et al. (2021) explained that "An effective form of leadership that seems to promote in an optimal way digital innovation is transformational leadership" (p. 4). Kouni et al. (2018) described transformational leaders as principals who have "a broad vision" (p. 158) and who can motivate and inspire teachers "to reach optimum utilization of their skills and

capabilities" (p. 158). Yamamoto and Yamaguchi's (2019) findings supported these statements.

Principals are responsible for driving innovation and change in schools by developing and sharing their vision of change, providing the necessary technical support and professional development for teachers, and by their willingness and ability to lead and learn to become technology-savvy. For these reasons, "it is critical that school administrators understand how to effectively implement and engage technology in schools" (Gonzales, 2019, p. 698). Milman and Rush's (2019) synthesis of the research conducted on school leadership and technology integration revealed that school leaders in the digital age need to be "effective, nimble, knowledgeable, and savvy technology leaders" (p. 12). These characteristics support the school leader who can develop and share a vision of change, plan and provide resources and effective training for teachers, monitor progress of the initiative, provide ongoing support and in so doing cultivate a culture of change that is needed to facilitate successful implementation of a 1:1 initiative.

**Review of the Literature Related to the eCAL Initiative**

Studies regarding the eCAL 1:1 initiative revealed that implementation of the initiative was less than successful. Briggs and Blair (2016) conducted a survey of 1,451 form three students from 32 secondary schools to investigate whether the program had met its objective of widespread laptop usage across the daily curriculum. The study reported that less than 1% of the students were taking their laptops to school every day. Some students were bringing the laptops once a month or once per week and they were

mainly used in technology-related classes. The data revealed that the laptops were

scarcely used in other disciplines and, when they were, they were used for presentations

and activities that involved collaboration and cooperation. This data indicates the students

were not required to bring the laptops to school for uses other than technology education.

The researchers reasoned that for the technology to be properly integrated, the majority,

if not all, of the students would engage in daily usage and therefore, bring their laptops to

school every day. In this case, the low number of students bringing the laptops to school

indicated that the initiative may have been an implementation failure.

Additional reasons attributed to limited integration included incidents of theft on

school premises because of failure to properly secure the hardware, students being robbed

of their laptops on their way home, Internet connectivity issues, problems connecting to

the Wi-Fi, a lack of technical infrastructure, lack of teacher training to integrate

technology into the curriculum, lack of teacher self-efficacy regarding using technology

in the classroom, and adherence to traditional pedagogical practices (Briggs & Blair,

2016; Jaikaran-Doe et al., 2016; Maharaj-Sharma et al., 2017; Onuoha et al., 2015, 2016;

Phillip et al., 2017).

Onuoha et al.'s (2015, 2016) case study explored the perceptions of seven

secondary school teachers at a boys' school to determine the impact of the eCAL 1:1

initiative on the process of teaching and learning. The teachers represented seven

different subject areas. Onuoha et al. (2015, 2016) agreed with Briggs and Blair (2016)

that there was no formal evaluation of the eCAL initiative. Five out of the seven teachers

found that the eCAL initiative positively affected their instruction but did not enhance student learning overall. Some of those teachers also indicated that students' grades had not improved. The teachers also revealed that, initially the technology did enhance learning, but the laptop technology could not be integrated in the classroom process because of damage and theft of equipment that was neither repaired nor replaced. Five of the seven participants also reported that the initiative negatively affected student learning since the laptop technology became a distraction to the students. Teachers discovered that students were using the laptops for non-academic purposes, such as accessing social media, pornographic content, playing games, and engaging in cyberbullying.

Jaikaran-Doe et al.'s (2016) mixed methods study examined the eCAL initiative by focusing on the secondary teachers' self-affect regarding using the laptops in the classroom. The researchers discovered that pre-service teachers had a greater self-affect concerning integrating technology in the curriculum than in-service teachers. The researchers argued that in-service teachers' lack of training and confidence regarding integrating technology into the curriculum contributed to the low implementation of the eCAL 1:1 initiative.

Phillip et al.'s (2017) phenomenological study explored the experiences of six secondary school teachers in Trinidad and St. Lucia when implementing 1:1 initiatives in their respective countries. Three of the teachers were involved in implementing the eCAL 1:1 initiative in Trinidad and Tobago. The researchers discovered major hindrances to program implementation, which they described as 'Missing Paddles' (p. 249). Phillip et

al. cited a lack of technical support and infrastructure, inadequate teacher training and professional development, and teacher low-self efficacy regarding ICT integration and managing students' technology use as challenges to program implementation. They also discovered that student lack of motivation, lack of Internet connectivity at home, lack of basic computer skills, and abuse and misuse of the technology were further elements that hindered program implementation. The researchers found that a lack of a clear directive regarding how to implement the government's policy was an additional hindrance to successful program implementation.

Harry and Mitchell's (2015) study presented a contrast to the previous studies. The researchers' case study explored the teachers' perspectives of what factors facilitated implementation of the eCAL 1:1 initiative. The researchers interviewed five teachers from different secondary schools who provided information about what factors facilitated implementation of the initiative. Harry and Mitchell (2015) proposed that adequate and ongoing professional development for teachers, teacher collaboration, teacher beliefs, accessibility and availability of equipment, proper infrastructure and good Internet connections, and the support and leadership of the principal were essential to helping the secondary school teachers successfully implement the eCAL program. The teachers in this study explained that their principals' support in terms of motivation, knowledge, and provision of resources was invaluable and encouraged and motivated them to continue to use the laptops in the classroom. This comment was consistent with Yonezawa and Stringfield's (as cited in Florian, 2000) finding that the "supportive and cooperative role"

(p. 20) of the principal was integral to maintaining change. Although the role of the principal is key to the successful implementation of reform in schools, there was a gap in the literature regarding implementation of the eCAL 1:1 initiative from the principal's perspective.

**ICT in Education in Trinidad and Tobago**

Trinidad and Tobago is a twin island republic located in the Caribbean Sea just off the northeast coast of Venezuela. The government of the Republic of Trinidad and Tobago (GoRTT), educators, and members of the Inter-American Development Bank determined that integrating technology in the public-school curriculum was an inevitable process to develop as a country and to compete on a global level (MoE, 2005; Phillip, 2008; Phillip et al., 2017; UNESCO, 2007). The country's educational, political, corporate, and financial decision-makers aspired to promote a technology-savvy society by equipping students with the knowledge, skills, and tools to employ technology in the workplace. These employable and marketable lifelong skills should ultimately benefit the country's economy and allow the nation to be a competitive force in a technology-driven global community. The GoRTT embarked on a mission, "To establish a technology-centered infrastructure focused on enabling the education system to be responsive to the dynamic social and economic environment" (MoE, 2005, p. 12).

The information society of the Commonwealth countries of the Caribbean and Latin America recognized and acknowledged that ICT in education is necessary to bridge a socio-economic divide, promote economic development, and enhance the process of

learning and instruction. In so doing these nations, "pledge to make maximum use of the potential of digital technologies in teaching and learning to ensure that educational systems keep abreast of new digital developments" (UN-ELAC, 2010, p. 12). Jennings (2017) explained that Commonwealth countries of the Caribbean expected that ICT integration in schools would transform the culture of teaching and learning (p. 9).

As a member of the Commonwealth of Learning, the GoRTT has been gradually attempting to introduce strategies and policies and to integrate ICT in the education system in the country. George's (2015) study of the ICT in education in Commonwealth Caribbean Countries outlined the following policies introduced by the GoRTT:

- 2003- fastforward

- 2005- Draft Policy for ICT in Education

- 2010- eConnect and Learn Programme Policy (eCAL)

- 2013- smarTT: The National ICT Plan 2014-2018

- 2014- Open and Distance Policy Learning Policy Framework (p. 67)

All of the programs involved investing in computers in the classroom, some level of training for teachers, and integrating ICT into the education system. However, it is unclear if any of the programs, policies, and initiatives met their objectives (George, 2015).

**eConnect and Learn (eCAL)**

In May 2010, the GoRTT, through The Ministry of Education (MoE), introduced the eConnect and Learn (eCAL) program, which was a one-to-one laptop innovation

(Briggs & Blair, 2016; Jennings, 2017; MoE, 2010; Onuoha et al., 2015, 2016; Trinidad and Tobago Computer Society, 2010). The innovation mandated that laptops be distributed to all students who passed the Secondary Entrance Assessment (SEA) examination and were embarking on their first year of secondary education. Under the eCAL program, the GoRTT awarded a grand total of 54,329 laptops from fiscal years 2010-2013 (Ministry of Finance and the Economy, 2015). The GoRTT invested large sums of money to implement this innovation, yet the technology had limited integration, and the initiative was not successfully implemented (Briggs & Blair, 2016). The government-led initiative developed goals to:

1. Enhance the learning environment for students in an ever-changing information age;

2. Improve the quality of instruction and support the infusion of ICT in teaching and learning and the development of 21st Century skills in students;

3. Reduce the inequity in access of computers and information between students from wealthy and poor families;

4. Raise student achievement through specific interventions such as improving students' understanding through the use of education software;

5. Facilitate the development of collaborative teaching and learning between peers within the school, among schools, and between teacher and student (MOE, 2010, pp. 3-4).

Currently, it seems that the eCAL 1:1 initiative has been replaced by another ICT policy with the goal of integrating ICT in the Trinidad and Tobago education system.

**Developing, Articulating, and Communicating a Shared Vision of the Intended Change**

Onuoha et al. (2015, 2016) found that the teachers may have been more willing to implement the eCAL 1:1 initiative if a clear vision of the initiative and its benefits had been communicated to them. Mwadulo and Odoyo's (2020) suggestion that it is necessary for both government and school management to share a vision and plan to realize successful ICT implementation supports this finding (p. 3).

**Planning and Providing Resources**

A lack of planning, training for teachers, and technical infrastructure to properly operationalize a program of the scale of a nationwide program may have contributed to the limited integration and therefore unsuccessful implementation of the initiative (Briggs & Blair, 2016; Jennings, 2017; Onuoha et al., 2015, 2016). Prior to the launch of eCAL, Sooknanan et al.'s (2002) study warned that stakeholders in Trinidad and Tobago were implementing ICT in the education system without gaining teacher buy-in and advised that this buy-in was essential to the future success of integrating computers into the curriculum. Theorists as early as Dewey (1938/1997) and Tyack and Cuban (1995) agreed that the teacher is central to successful educational reform. Briggs and Blair (2016) argued that if stakeholders identified potential barriers before the launch in a pre-

planning and development phase, many of the barriers could have been mitigated, therefore, improving the opportunity for successful implementation of the initiative.

**Professional Development and Training**

Since the late 1990s, the GoRTT has been making an effort to integrate ICT in the education system of Trinidad and Tobago (Augustine, 2015; George, 2015). Research showed that teachers had low self-efficacy and a lack of knowledge and training regarding integrating technology into the curriculum (Briggs & Blair, 2016; Onuoha et al., 2015, 2016; Phillip et al., 2017). Onuoha et al. (2015, 2016) reported that teachers were trained according to the 'Cascade Approach' (p. 7) in which some of the teachers underwent two days of training and were then expected to train their colleagues. The teachers who received training and professional development, received limited training (Jennings, 2017). Jennings (2017) described the training as inadequate (p. 10). Phillip et al. (2017) contended that the teachers were "left to traverse 'up a creek without a paddle'" (p. 245) due to the lack of training.

Onuoha et al. (2016) recommended that "for ICT integration to be successful, there should be training which should be on-going to enable teachers to be competent and confident in infusing ICT in their lessons" (p. 40). Jaikaran-Doe et al. (2016) concurred with Onuoha et al. (2016) concerning professional development for the secondary school teachers in Trinidad and Tobago. The researchers confirmed that the teachers needed adequate training to integrate the laptops in the classroom process "in productive ways" (Jaikaran-Doe et al., 2016, p. 9). Steinbach (2012) declared that teachers in Trinidad and

Tobago do not have a history of rich professional development. It seems that many

teachers were trained at a 2-year teachers' training college or have a 4-year degree in

their subject area.

Another issue could be that the process of teaching and learning in Trinidad and

Tobago has been traditionally more teacher-centered and successful integration of laptops

in the curriculum requires a more learner-centered approach to teaching and learning.

Teachers have more of a behaviorist approach (Jennings, 2001) using rote memorization.

The teacher is the fountain of knowledge and supports the regurgitation of learning to

pass rigorous assessment. This approach opposes the constructivist approach, which

involves active learning, project- and problem-based learning, and independent learning,

giving the students more autonomy in the classroom, and facilitating the development of

higher-order critical thinking skills. Jennings (2001) referred to the pedagogy of

Caribbean teachers as "entrenched didactic teachers' practices which support teacher

dominance" (p. 131). Both Jennings (2001) and Steinbach (2012) cited inadequate

professional development and training for the ongoing process of archaic pedagogical

practices which are not conducive to a praxis that is essential for effective technology

integration.

**Checking Progress**

Briggs and Blair (2016) and Onuoha et al. (2015; 2016) reported that three to four

years after the implementation of the eCAL 1:1 initiative, there was no formal evaluation

of the program to determine whether the initiative met its objective to enhance teaching

and learning. Briggs and Blair (2016) mentioned that there were no checks put in place to monitor the progress of the initiative. The researchers suggested that this oversight "is symptomatic of the view of implementation of the laptop innovation, as an event and not a process" (Briggs & Blair, 2016, p. 556). Phillip et al. (2017) added that low implementation and a lack of monitoring were symptoms of a failure to develop a mandate for integration for each school.

**Providing Continuous Assistance**

The research recommended continuous support in terms of training (Onuoha et al., 2016). Onuoha et al.'s (2015, 2016) research suggested that one of the reasons for limited integration of the laptops is because when the equipment gets damaged, it is not repaired. Teachers cannot integrate laptops if the students are not equipped. Teachers implementing the initiative have complained about Internet problems, stolen laptops, damaged laptops that have not been repaired or replaced, and hardware problems (Briggs & Blair, 2016; Onuoha et al., 2015, 2016; Phillip et al., 2017). A lack of IT staff to provide continuous assistance to teachers and to help remedy these problems is a contributing factor to the unsuccessful implementation of the initiative (Onuoha et al., 2015, 2016; Phillip et al., 2017).

**Creating a Context Supportive of Change**

Harry and Mitchell (2015) reported that the teachers in their study commended the principals on creating an environment which was supportive of change and credited leadership support as invaluable and necessary to the successful integration of the laptops

in their classroom process. Onuoha et al. (2016) noted that the GoRTT offered an ICT

award to motivate teachers to integrate laptops into their lesson plans. By providing some

opportunity for professional development and offering teachers an incentive to integrate

laptops in their classroom process, it could be surmised that the GoRTT attempted to

create supportive change environments. However, the need was for ongoing training and

professional development for teachers. Additionally, the need for IT support, better

quality hardware, and increased and improved technical infrastructure contributed to low

implementation of the initiative (Phillip et al., 2017).

### Summary and Conclusions

Chapter 2 has provided a review of the literature regarding the role of the

principal in effective ICT implementation and integration within the conceptual

framework of Hall and Hord's (2015) six functions of effective change facilitators. This

body of knowledge has revealed that successful ICT implementation and integration

require that principals nurture an environment that is supportive of change at the school

level. These principals should be technology leaders who provide opportunities for

teacher training and professional development. Successful implementation of 1:1

initiatives involve principals who develop and share the vision for integrating technology

in the classroom. These principals obtain teacher buy-in and support, model, and

encourage teachers' use of technology in the classroom to enhance the process of

teaching and learning to promote academic achievement and a 21$^{st}$ century, learner-

centered environment. The principal, therefore, is central and integral to the successful implementation of 1:1 initiatives.

The literature also indicates that principals who display the six functions of a successful change facilitator enable successful initiatives. Upon review of the literature concerning the eCAL 1:1 initiative within this conceptual framework, it was unclear whether the six functions of successful change facilitators were employed when implementing the initiative. Research indicated that the eCAL 1:1 initiative was lacking in all six areas highlighted in Hall and Hord's conceptual framework, which may be a major contributing factor to the lack of successful implementation of the initiative. However, all of the existing research centered on the perspectives and lived experiences of the secondary school teachers and students. In contrast, this review of the literature revealed a lack of knowledge about implementation of the eCAL 1:1 initiative from the perspective of the principal. Chapter 3 will detail and describe a research design to explore what factors affected the implementation of the eCAL 1:1 initiative from the perspective of the secondary school principal. The chapter will present and describe the central research question, research design, selection of target participants, the instrument used to collect data, and a plan to analyze and confirm the trustworthiness of the data.

Chapter 3: Research Method

Research is a methodical and analytical process by which researchers can find answers to questions about specific phenomena (Creswell, 2013). Qualitative methodology provides a better understanding of how individuals process and make meaning of phenomena within their natural setting (Creswell, 2013; Flick, 2017; Merriam & Tisdell, 2016; Patton, 2015). Qualitative approaches are suitable when researchers want to explore the perspectives and lived experiences of individuals in order to understand certain phenomena and use text to convey meanings and understandings of the phenomena. The approach a researcher chooses depends on the ontological and epistemological worldview of the researcher, but ultimately the researcher will select the design that will best suit the research topic and answer the research question (Creswell, 2013).

Within the qualitative research framework, this study used a basic qualitative approach to design to explore what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative from the perspective of secondary school principals in Trinidad and Tobago. Percy et al. (2015) explained that the basic qualitative approach was suitable to research investigating "People's attitudes, opinions, or beliefs about a particular issue or experience" (p. 76). This study aimed to gather data about the principals' experiences to contribute to the existing body of research on the topics of technology integration and implementing change in the education system. The study

could inform the practice of implementing change and integrating computing technology in the process of teaching and learning.

## Research Design and Rationale

The central research question for this basic qualitative study is: What factors affected implementation of the laptop technology under the eCAL 1:1 initiative from the perspectives of the secondary school principal in Trinidad and Tobago?

Different qualitative approaches can answer questions that aid in understanding the reality of phenomena from a human perspective. Narrative inquiry is suited to exploring the lived experiences of an individual through stories presented in chronological order, and ethnographic research investigates individuals' experiences and perceptions within their cultural context (Creswell & Poth, 2018). Grounded theory is appropriate for research intent on generating theory, and phenomenology is the approach used when seeking rich, in-depth exploration of "the essence of [a] phenomenon (Creswell & Poth, 2018, p. 105). These methodologies were not the most suitable for exploring the principals' perspectives of what factors affected implementation of the eCAL initiative. Initially, this study intended to use a case study design, as the secondary school principals in Trinidad and Tobago were considered to be a bounded case. However, this methodology involves "using multiple methods and multiple source of data" (Percy et al., 2015, p. 76). Due to the abrupt closing of schools in Trinidad and Tobago due to COVID, interviews and documents were the only available data sources.

Basic qualitative inquiry is a type of research used when the researcher seeks knowledge and understanding of a phenomenon or a process, and not necessarily for application or to solve a problem (Given, 2008; Kennedy, 2016; Patton, 2015; Percy et al., 2015; Salkind, 2007). However, the information gained from using this approach could lead to the development of problem-solving strategies and policies (Salkind, 2007). This type of research has its foundation in constructivism, which assumes that the reality of phenomena is based on the meaning given to it by individuals' experiences with the phenomena (Kahlke, 2014; Merriam & Tisdell, 2016). The aim of basic qualitative inquiry is to unpack and decode that meaning. Merriam and Tisdell (2016) explained that the objective of basic qualitative inquiry is to "understand how people make sense of their lives and their experiences" (p. 23). In this sense, the typology is concerned with understanding a process or phenomenon by the portrait painted by the principals' impressions and experiences.

The central purpose of basic qualitative research to seek "knowledge as an end in itself [and] to discover truth" (Patton, 2015, p. 250) and its aim of understanding a process according to the meaning constructed by individuals make this type of research best suited to my study. Knowledge of the experiences and the impressions of the principals could allow the reader to better understand the process of integrating laptops in the process of teaching and learning under the eCAL initiative. Merriam and Tisdell (2016) indicated that basic qualitative inquiry is perhaps most commonly used for educational research (p. 24). This reasoning could be attributed to the suitability of this

typology for understanding a process or practice, such as integrating technology in the practice of teaching and learning.

## Role of the Researcher

The researcher is the instrument for collection, analysis, and interpretation of data in a qualitative research study (Hoepfl, 1997; Merriam & Tisdell, 2016; Tufford & Newman, 2012). The researcher must have theoretical sensitivity, insight, and the ability to understand and unpack the data for meaning (Hoepfl, 1997; Merriam & Tisdell, 2016). Reviewing the literature and applying experience as a researcher strengthens this sensitivity. The reader needs to see that the researcher has the appropriate level of sensitivity to accurately interpret and analyze the data. As such, it is imperative that the researcher be reflexive about the research process and transparent in this reflexivity so that the reader is aware of any bias (Merriam & Tisdell, 2016; Patton, 2015). It is important for the reader to be aware and informed of how the researcher is positioned in relation to the research to control for bias (Salkind, 2010). It is, therefore, necessary for the researcher to reveal any personal beliefs, preconceptions, predispositions, and personal and professional connections that may affect the retrieval, examination, and explanation of the findings.

My position as researcher for this study was to design interview questions that gathered the necessary data to answer the central research question, and to conduct careful and objective analysis of the data. I also developed and maintained a separate organized compilation of all raw data to accompany the research report and strengthen

the dependability of the data. The interviewees included secondary school principals and vice-principals with whom I have no direct or personal connection. In an effort to manage bias, I revealed that I was raised and educated in Trinidad and Tobago but do not currently reside in the country. I have familial ties to the country, and I have an interest in the education system. I do believe that 1:1 initiatives can enhance the process of teaching and learning and support fair and equal access to curriculum for all students. Due to the subjective nature of my role as the instrument for investigation and analysis, the method of bracketing was employed "to mitigate the potential deleterious effects of unacknowledged preconceptions related to the research… and thereby to increase the rigor of the [study]" (Tufford & Newman, 2012, p. 2).

**Methodology**

**Participant Selection Logic**

A purposive sampling approach of "key knowledgeables" (Patton, 2015, p. 284) was used to select participants since I was seeking individuals who have the knowledge and the experience to provide thick and rich data for this study (Etikan et al., 2016; Patton, 2015. Rubin & Rubin, 2012; Sandelowski, 2000). Rubin and Rubin (2012) advised that researchers should seek participants who can share their actual experiences regarding the topic to obtain "real events [and] real experiences" (p. 60). Patton (2015) pointed out that qualitative inquiry usually seeks rich, in-depth information from a small number of cases (p. 264). Studies show that the researcher achieves saturation when no new information is gleaned from the participants recruited for the study (Baker et al.,

2012; Mason, 2010; Patton, 2015). While there is no consensus as to the number of

participants that constitutes data saturation, research shows that a study may have reached

data saturation when no new themes or codes emerge from the data, and when the study

can be replicated (Fusch & Ness, 2015; Guest et al., 2006). For this study, I intended to

select six information-rich interviewees, as it has been noted that at least six participants

may constitute saturation (Fusch & Ness, 2015; Guest et al., 2006).

The target group consisted of secondary school principals and vice-principals who

were involved in facilitating and leading the implementation of the eCAL 1:1 laptop

initiative. These individuals were included since the literature established that the

principal as a technology leader plays a vital role in the successful implementation and

integration of ICT in schools (Afshari et al., 2009; Claro et al., 2017; Oliver et al., 2012;

Pautz et al., 2015; Schiller, 2002; Yee, 2000). The sample excluded elementary school

principals, vice-principals, and teachers, staff, and administration, since the eCAL 1:1

initiative was designed only for secondary schools. The sample will also exclude high

school teachers, administrative staff, parents, students, and any other stakeholders in the

educational community who did not play a leadership role in the secondary school

system. Thus, only secondary school principals and vice-principals who reside in the

country of Trinidad and Tobago were contacted and interviewed by email.

Participants were selected by chain sampling (Patton, 2015), starting with one key

informant who was suggested to be a knowledgeable principal by a teacher who was

involved in implementing the eCAL initiative. This informant was subsequently asked to

suggest other principals and vice-principals who could provide their perspectives and lived experiences when implementing the eCAL 1:1 initiative. Each participant was recruited upon referral from the previous participant and was contacted by email.

**Instrumentation**

Interviews are the best tool for retrieving the rich, in-depth information needed to answer the research question. Patton (2015) explained that "open-ended responses are the heart of qualitative data, and they emerge from asking open-ended questions" (p. 446). Therefore, in-depth e-mail interviews were used to obtain rich and thick data from participants who had first-hand experience with leading and facilitating the implementation of the eCAL 1:1 laptop program.

The central research question was drafted based on a lack of research regarding what factors affected the implementation of the eCAL 1:1 laptop program, from the secondary school principal's perspective. While the current literature informs the question regarding factors which affected implementation of the eCAL 1:1 initiative, there was a gap in the literature concerning the secondary school principal's perspective (Briggs & Blair, 2016; Harry & Mitchell, 2015; Jaikaran-Doe et al., 2016; Maharaj-Sharma et al., 2017: Onuoha et al., 2015, 2016).

Hall and Hord's (2015) six functions of the effective change facilitator provided the conceptual framework for the interview questions designed to explore and unearth the principals' impressions and experiences when implementing the program. The interview consisted of questions that were vetted by a panel of experts in the field of education. A

pilot study was conducted, and the experts responded to the questions as asked. Since no changes were suggested for the interview questions, the questions were deemed reliable and appropriate for accessing the data being sought to answer the research question (see Appendix A).

The e-mailed research instrument was a semi-structured interview (Rubin & Rubin, 2012) using standard open-ended questions (Patton, 2015; Turner, 2010). Each participant received the same set of open-ended questions, specific to the topic. Follow-up questions were asked if there was a need to clarify any responses, and to get the participants back on track if they misinterpreted a question or if they did not provide ample responses to any of the questions (Jacob & Ferguson, 2012; Turner, 2010). The idea was to "combine structure with flexibility" (Ritchie & Lewis, 2003, p. 141).

The emailed interview began with an introduction of the researcher and an explanation about the study followed by questions to obtain specific demographics and open-ended questions to invite participants to openly share rich details (Jacob & Ferguson, 2012; Ritchie & Lewis, 2003). The ensuing questions were designed to get real and true data (Rubin & Rubin, 2012) about the principals' experiences implementing the program. To support the rigor and credibility of the interview guide, the interview questions were based on concepts from the review of the literature on the topic of implementing 1:1 laptop programs, technology integration, and the conceptual framework of the six functions of the effective change facilitator. Artifacts, such as official documents specific to the initiative and unofficial documents (journals or diaries)

could be helpful in addition to the interview process to triangulate the interview data and strengthen the validity and reliability of the data (Fusch & Ness, 2015; Patton, 2015; Salkind, 2010).

The interview protocol included a request to participate, the interview questions, and a closing statement. The request to participate included a formal introduction, an explanation of the premise of the research, the reason for conducting the study, and an Informed Consent form (see Appendix A). The request also mentioned the issue of maintaining the anonymity of the participant. The interview guide included a closing statement thanking the participant for their cooperation, my contact information, and a request for permission to contact the participant with follow up questions, comments or clarification.

**Procedures for Data Collection**

An email format was used for the interviews. E-mail interviews were most suitable for this study primarily because the participants work and reside in an international location. There were, however, additional benefits to using the e-mail format. Technology not only allowed educators to perform functions in the classroom that could not be done before but also opened avenues for researchers "including the initial acquisition of data" (Bampton & Cowton, 2002, p. 1). E-mail interviews or "e-interviews" (Bampton & Cowton, 2002, p. 2) supply written responses, which could provide the kind of rich and detailed information that would render trustworthy, credible data. McCoyd and Kerson (2006) found that, after using the three methods of face-to-

face, telephone, and e-mail interviews, "the email interviews tend to be more complete, to include more self-reflection by respondents, and to be seemingly more candid" (p. 390).

Due to its asynchronous nature, e-mail interviews allow participants to take the time needed to carefully review the questions and craft deep, detailed, and reflective responses to the interview questions at a location and time which is most convenient and desirable for the interviewee (Banpton & Cowton, 2002; Gibson, 2010; McCoyd & Kerson, 2006). The e-interview gives participants an opportunity to review and refine their responses in order to convey accurate reflections and impressions (Bampton & Cowton, 2002; Gibson, 2010). The e-interview also allows participants a degree of anonymity which could encourage participants to be more relaxed and comfortable to reveal details that they may not feel comfortable to reveal in a face-to-face setting (Bampton & Cowton, 2002; McCoyd & Kerson, 2006). The e-interview process is advantageous to the researcher in that the responses provide a readily available transcript. This benefit helps researchers to avoid errors in transcribing data and utilize the time that would have been spent transcribing data to execute careful data analysis. This method also eliminates the costly process of traveling to conduct interviews and allows the researcher easy access to international participants (Bampton & Cowton, 2002; Gibson, 2010) as is the case in this study.

The e-mail format also may reduce the opportunity for equipment malfunction when recording interviews, and misunderstanding or misrepresenting what was said while taking and summarizing interview notes. This method could also make it easier for

the researcher to capture direct quotes (Meho, 2006; Rubin & Rubin, 2012). I also

planned to ask any follow-up questions using social media channels such as Facebook

Messenger, Skype, or WhatsApp. These platforms allowed for immediate access to the

interviewees to get clarification about responses or to probe for more information. There

is no cost involved when using these tools and participants can communicate privately.

The first "key knowledgeable" individual was contacted within one week after

IRB approval. All participants were contacted within five weeks after the first participant

was contacted. If a participant did not respond within two weeks after first contact, I

followed-up with a second email. If the initial attempt to recruit participants resulted in

too few participants, the procedure was as follows:

- A letter explaining the premise of the study and requesting permission to

  access the principal database for public schools in Trinidad and Tobago

  will be sent to the Ministry of Education (MOE).

- Potential candidates will be selected based on the criteria for inclusion for

  the study and letters including a formal introduction, an explanation of the

  premise of the study, and an Informed Consent form will be emailed to the

  potential participants.

- The interview questions will be emailed to the potential candidates upon

  granting consent to participate in the study.

Documents were also to be used as sources of data. Formal documents pertaining

to the eCAL program such as administrative school reports and records were to be

reviewed for information. In addition, informal or personal documents of the participants, such as emails, notes, letters and diary or journal entries were to be carefully analyzed and used to triangulate the interview data. An Internet search was conducted for any formal documentation pertaining to the eCAL 1:1 initiative. I also requested permission to examine any formal and informal documents held by the interviewees.

**Data Analysis Plan**

The interviews were cross-analyzed, coded, and categorized according to consistencies, similarities, and disparities in the data. Patton (2015) explained that, "an interview guide, if it has been carefully conceived, actually constitutes a descriptive analytical framework for analysis" (p. 534). In coding the interview data, the responses of each participant to each question were scrutinized for themes and subthemes. This method was deemed suitable since this study used a standard interviewing protocol in which all interviewees received the same set of questions. The documents were compared to the interview data for information that supported or contradicted the data. If disparities were found, suggestions were made for future research to explore and investigate the possible contradictions.

Coding and analysis were organized around key issues that arose from the data (Patton, 2015, p. 535) which illuminated what supports were available to facilitate implementing the national program and what challenges occurred to influence successful implementation of the program. The coded data were then tabulated to reflect a list which was used to further organize the data into distinct categories and associated concepts for

thematic analysis. This analysis produced a narrative that answered the research questions and gave an accurate portrayal of the experiences and impressions of the participants.

## Issues of Trustworthiness

Issues of trustworthiness in qualitative research are measured according to the criteria of credibility, transferability, confirmability, and dependability (Anney, 2014; Patton, 2015; Shenton 2004). These "post-positivist criteria developed by Lincoln and Guba" (Patton, 2015, p. 684) have become widely accepted by naturalist researchers as determinants of rigor in qualitative research.

### Credibility

Credibility is established when the interviewer is careful to select participants who have firsthand knowledge of the phenomenon, therefore increasing the chance that the data shared is authentic (Anney, 2014; Rubin & Rubin, 2012), and that their interpretation of the interview data is an accurate representation of the participants' thoughts and impressions (Anney, 2014; Patton, 2015; Shenton, 2004). To ensure credibility, secondary school principals and vice-principals who have leadership roles in facilitating the implementation of the eCal 1:1 laptop program were selected. Collecting emailed responses also ensured credibility, as the data was recorded in the interviewees' own words. An additional strategy for ensuring credibility included confirming the strength of the instrument in terms of the use of well-crafted and tested interview questions, which were informed by current research on the topic. The method of data source triangulation was implemented by using official documents pertaining to the

eCAL program to cross check and verify the data for authenticity (Anney, 2014; Shenton, 2004).

**Transferability**

Transferability is the extent to which readers can see the study as an example of their own situation (Anney, 2014; Patton, 2015; Shenton, 2004). To strengthen transferability, data were obtained from participants who have firsthand knowledge specific to the eCAL 1:1 initiative. In addition, ample details were provided about the parameters of the study, the methodology, inclusion and exclusion criteria for participants, the analysis and the results so that readers may see examples of their situation and apply the findings to their own contexts.

**Dependability**

Dependability refers to how well the researcher explains and represents the process so that the reader could depend on the results to be real and true (Anney, 2014; Patton, 2015; Shenton, 2004). This element requires "proper organization and documentation of the data collected" (Yin, 2018, p. 130), so that the reader is presented with a compilation of all the data collected in conjunction with the data analysis. I created a research database consisting of a collection of the data from the study and reflecting all data sources. Developing and maintaining a research database strengthened the dependability of the study.

**Confirmability**

Confirmability is the extent to which the researcher can show that the data and results have not been manipulated to get a specific desired result (Anney, 2014; Shenton, 2004). Confirmability shows evidence that researcher bias was exposed and controlled and that the findings are a true result of an analysis of the actual thoughts, impressions, and experiences of the participants (Anney, 2014; Shenton, 2004). Maintaining a thorough audit trail and using data triangulation are useful strategies for determining that "the data and interpretations of an inquiry were not merely figments of the inquirer's imagination" (Patton, 2015, p. 685). Again, an audit trail will ensure transparency and confirmability. I have also positioned myself in relation to the study in the section entitled, (see 'Role of the Researcher') to expose any researcher bias that may influence data retrieval and analysis.

**Ethical Procedures**

All participants in this study were given pseudonyms to protect their confidentiality. To ensure confidentiality, the data collected were saved electronically in files created according to the pseudonym of the participants and backed up on an external hard drive. Copies of participants' written records as well as copies of official records were printed and kept in a locked cabinet in my home office. The data will be maintained for five years and subsequently destroyed. All documents of consent and approval, including the IRB application have been stored electronically and backed up on a hard drive.

**Summary**

Chapter 3 outlined the rationale and research design for this basic qualitative study. The chapter included an explanation of the qualitative approach to inquiry used for this study and why other approaches were not used. The role of the researcher was identified, along with an explanation of which participants were selected, which participants were excluded, and how the interview questions and guide were designed. Chapter 3 also included a plan for analyzing, ensuring the trustworthiness, storing, and maintaining the confidentiality of the data. Chapter 4 will present the results of the study.

Chapter 4: Results

The purpose of this basic qualitative study was to explore and gain a better understanding of what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative from the perspective of secondary school principals in Trinidad and Tobago. The central research question for the study is as follows:

- From the perspective of the secondary school principals, what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative?

This chapter presents details about how the study was conducted, including the conditions for collecting data, participant demographics, and data collection and analysis. This chapter also illustrates how the data was confirmed and triangulated to support the credibility and dependability of the study. This evidence will show the trustworthiness of the data so that the information could be transferable to similar educational environments. Finally, evidence from the interview data and documentation is analyzed and applied to answer the research question.

**Setting**

The participants of this study were principals and vice-principals of secondary schools in Trinidad and Tobago. The country of Trinidad and Tobago is a twin-island republic in the Caribbean. Due to the geographical distance between the participants and the researcher, it was difficult to conduct face-to-face interviews. Voice and video messaging technology were not preferable due to concerns about the reliability of the

Internet. The email interview process was selected as the preferred data collection method. Once schools were shut down in early March 2020 due to the COVID-19 pandemic, potential participants were concerned with 'sheltering in place', meaning managing their lives from their home base. This circumstance made the email interview process more appealing to already overwhelmed participants.

## Demographics

The participants of this study were principals and vice-principals of secondary schools in Trinidad and Tobago who were involved in facilitating and leading the implementation of the eCAL 1:1 government laptop initiative in secondary schools. These individuals were considered to be those who would have firsthand knowledge of the process of executing the eCAL 1:1 laptop initiative. Also, a review of the literature characterized the principal as a technology leader and illustrated how the principal plays a vital role in the successful implementation and integration of ICT in schools (Afshari et al., 2009; Claro et al., 2017; Oliver et al., 2012; Pautz et al., 2015; Schiller, 2002; Yee, 2000). The target number of participants was six since research shows that this number of participants could constitute saturation (Fusch & Ness, 2015; Guest et al., 2006). However, only three participants responded after six months of persistently emailing secondary school principals.

Table 1 illustrates the demographics for the participants of the study. The participants consisted of two principals and one vice-principal from secondary schools in Trinidad and Tobago. All the participants are female with university degrees. The

principal identified as P1 holds a master's degree in education with a specialization in youth guidance. The principal known as P2 earned a Bachelor of Science degree in Information Technology. The principal identified as P3 also holds a master's degree in education. Overall, the principals have a total of 29 years of experience.

**Table 1**

*Participant Demographics*

| Characteristics | P1 | P2 | P3 |
|---|---|---|---|
| Experience | 6 years | 11 years | 12 years |
| Gender | Female | Female | Female |
| Highest Academic Degree | M.Ed. | BSc | M.Ed. |

**Data Collection**

The initial plan was to contact the first potential participant within one week following receipt of IRB approval. Then, other participants would be selected by chain sampling (Patton, 2015). The first individual would suggest another, and this snowball method would continue until the necessary data had been gathered from a total of six participants. IRB approval #07-25-19-0168965 was received on 07/25/2019. The initial plan was implemented; however, the plan did not result in any participation. Potential participants would agree to be interviewed and later, would refuse to respond to the questions. So, the second strategy was implemented. I submitted a letter requesting permission to conduct research in the education system to the Ministry of Education on 09/30/2019. I received a reply with a list of documents that I was required to produce on 10/04/2019. Following a lengthy exchange of emails and documents, approval from the

Ministry of Education was granted on 12/04/2019. A change of procedures form was submitted to the IRB on 12/15/2019 and approval was received on 12/17/2019.

Following this process, the Ministry contact informed me that they did not provide contact information for schools, so I would have to research this information myself. I proceeded to retrieve information via the Internet, which was difficult as either the schools did not have a website or the website was not functioning. Online email information or a website could only be found for a total of 15 out of 77 secondary schools. Emails were sent to all 15 schools with no responses. I finally received consent from one principal along with several promising referrals. Then, with the threat of COVID-19, schools in the country shut down abruptly and potential participants requested that I contact them later, when schools reopened. Many of the schools did not reopen, but data was finally collected from three principals. Emails including the consent forms, interview guides, and the approval letter to conduct research were sent to the principals. The participants returned their consent forms and responses to the interview guide by email. Although the principals responded quickly, it was difficult to get answers to follow-up questions.

The Ministry of Education was helpful to provide reports detailing the money spent on hardware, software, and training. A report was also provided listing the schools that received laptops. However, there were no formal reports presenting information about the progress or lack thereof of the eCAL 1:1 initiative. The representative who was assigned to provide me with secondary data explained that "the MoE would not say that it

[eCAL initiative] was unsuccessful… whether it was so or not but if you obtain the views of the teachers/principals you will definitely be able to put together something" (Representative from the Ministry of Education, 2020).

### Data Analysis

The interviews were analyzed in their current condition, as there was no need to transcribe the data since the emails were a verbatim record of the participants' words. First, I scrutinized each interview and divided the data into two categories looking for factors that supported implementation of the 1:1 initiative and factors which presented challenges to implementation of the 1:1 initiative. I color-coded the data as follows: Blue for supports, yellow for challenges, and grey for neither. Then I tabulated the data according to the occurrence of each category by color. In each case, the supports outweighed the challenges by an average of 2:1.

The interviews were then copied to an Excel spreadsheet so that they could be coded line by line. I used what Saldaña (2016) refers to as "In Vivo codes" (p. 77) for this second round of coding to capture the true meaning and essence of the data in the participants' own words. "Coding is the transitional process between data collection and more extensive data analysis" (Saldaña, 2016, p. 5). So, once the individual interviews were recoded, the information was cross analyzed in search of similarities and differences. The analysis was conducted in this manner to properly flesh out the data. The cross-analysis revealed consistent and divergent patterns in the data.

The second cycle of coding further illuminated factors that affected implementation of the 1:1 laptop initiative. Receipt and distribution of the laptops were described as "a very labour intensive procedure" (P1) by one principal and "tedious" (P2) by another. P1 also described experiencing "anxiety" and "great concern" regarding taking possession of and securing the laptops. All three principals had a vision for the eCAL program that involved integrating the laptops into the curriculum. Two of the principals' visions were focused on teacher training and integration, while the third principal mentioned integration from the standpoint of the student.

Additional codes illuminated training of teachers and principals as a factor that affected implementation. P1 mentioned "some short training in courses" for "teachers who had no ICT experience". Another principal explained that "technology training was ongoing" (P3). This principal also described attending "a workshop showing how technology could be used" and further expounded that the workshop was "not really effective." The other two principals had not received any training prior to the roll out of the program. Early data coding also revealed teacher low self-efficacy and the need to encourage teachers as factors. Technology misuse by the students, theft of the laptops, and technical issues were additional factors affecting implementation that became evident early in the process of data analysis.

I performed a third round of coding to look deeper into the data. Table 2 illustrates the third cycle of codes and number of times these codes were discovered in the interviews. A cross analysis of the interview data revealed that the participants

referred to training and professional development most frequently followed closely by principals' perceptions of the program implementation, environment of change, and ICT/technology integration. Also of note are the number of times the Ministry of Education (MoE) was mentioned in the data and the number of times the principals mentioned that they had to encourage teachers to become comfortable with the technology and integrate the laptops into their curricula. Out of the 18 codes identified in the third cycle of coding, the first five counted for a little over half of the total frequency of the codes listed in Table 2.

**Table 2**

*Frequency of Third Cycle Codes in the Interview Data*

| Third Cycle Codes | Frequency |
| --- | --- |
| training/PD/workshops | 18 |
| principals' perceptions | 14 |
| environment of change | 10 |
| ICT/technology integration | 10 |
| Ministry of Education (MoE) | 9 |
| encouraging teachers | 8 |
| distribution/distributed laptops | 7 |
| implementation/implement | 6 |
| Heads of Department (HoDs) | 5 |
| laptop usage/noneducational use | 5 |
| vision/intention | 5 |
| monitor/monitoring/random checks | 4 |
| sharing the vision | 3 |
| no program evaluation/not systematic | 3 |
| technical/technical infrastructure issues | 3 |
| lack of ICT skills/low teacher self-efficacy | 3 |
| device safety/security/theft | 3 |
| IT background/ICT competent | 2 |

Table 3 illustrates the four themes that emerged from the coded data listed in
Table 2. These categories are ranked in order of the frequency that the codes from which
they emerged occurred in the date from the highest to the least. The codes reflect themes
that are pervasive in the current body of literature pertaining to educational technology
and technology integration. In-depth analysis of the data revealed that the factors
affecting implementation of the 1:1 laptop initiative occurred concordant to the broader
themes of program implementation, technology integration, role of the principal, and
training and professional development.

**Table 3**

*Themes Derived from Codes in the Data*

| Codes | Themes |
|---|---|
| principals' perceptions of implementation environment of change Ministry of Education (MoE) Heads of Departments (HoDs) sharing the vision no program evaluation technical/technical infrastructure issues | Program Implementation |
| ICT/technology integration encouraging teachers laptop usage/noneducational use lack of ICT skills/low self-efficacy IT background/ICT competent | Technology Integration |
| distribution/distributed laptops implementation/implement vision/intention monitor/monitoring/random checks device safety/security/theft | Role of the Principal |
| training/Professional development/ | Training and Professional Development |

Workshops

Table 4 illustrates the frequency with which the themes appeared in the interview data. The themes are listed in descending order from the greatest to the least. The data is displayed in this way to show an order of importance for each theme in determination of the factors that influenced the implementation of the 1:1 laptop initiative. Factors pertaining to the implementation of the program, technology integration, and the role of the principal accounted for 85% of the total frequency of factors that affected implementation of the 1:1 laptop initiative. These themes are explained further in the 'Results' section of the dissertation.

**Table 4**

*Factors That Affected Implementation of the 1:1 Laptop Initiative*

| Themes | Frequency (%) |
| --- | --- |
| Program Implementation | 47 |
| Technology Integration | 28 |
| Role of the Principal | 25 |
| Training | 18 |

Finally, the themes were analyzed under the lens of the two original categories; supports and challenges. This analysis confirmed the initial determination that there were factors which supported implementation of the 1:1 laptop initiative and factors which presented a challenge to implementation. The frequency of factors which supported program implementation outweighed the challenges by a ratio of 2:1.

**Evidence of Trustworthiness**

In Chapter 3, I explained that the issues of trustworthiness in the data were measured according to the criteria of credibility, transferability, confirmability, and dependability (Anney, 2014; Patton, 2015; Shenton, 2004). The issue of credibility was addressed by selecting and interviewing key, knowledgeable participants who were secondary school principals and vice-principals with as much as ten years' experience. The two principals hold a master's in education and the vice principal holds a Bachelor of Science degree in Information Technology. As school leaders, all the candidates were directly involved in the process of implementing the eCAL 1:1 laptop program in the secondary schools. The interviewees, therefore, had firsthand knowledge of the subject thereby ensuring authenticity of the data (Anney, 2014; Rubin & Rubin, 2012).

The use of emailed interview data also strengthened the credibility of the data as the information provided represents the exact thoughts and impressions of the interviewees (Anney, 2014; Patton, 2015; Shenton, 2004). The participants responded to the same set of well-crafted and tested interview questions that were supported by current research on the topic, thereby ensuring the strength of the instrument. In addition, the researcher employed the method of data source triangulation to cross-check the data for authenticity. It was the original intention of the researcher to seek unofficial documents from the participants, such as journals, diaries, and notes from meetings. However, in response to the pandemic, the participants were directed not to return to the premises

once schools were shut down and these materials were irretrievable. The researcher used official documents procured from the MoE as secondary data.

Transferability of the data was ensured by including the interview data from participants and clearly outlining the methodology of the study. The criteria for selecting the participants, as well as a clear explanation of the analysis and the results aided in transferability, as readers could see an example of their own situation and apply the findings to their own contexts (Anney, 2014; Patton, 2015; Shenton, 2004). In like manner, the detailed explanation of the data analysis, derived from key experts, support the reporting of the results to be real and true (Anney, 2014; Patton, 2015; Shenton, 2004), thereby ensuring the dependability of the data. In addition, the researcher developed and maintained a research database (see Appendix B) of the data that was collected.

The data was collected from the interviewees and analyzed verbatim. As such, there was no manipulation of the data. The findings of the study are, therefore, a true result of the actual thoughts, impressions, and experiences of the participants, thus ensuring the confirmability of the data (Anney, 2014; Shenton, 2004). The issue of confirmability of the data was further addressed by triangulating the data using secondary data in the form of documents from the MoE. Finally, I stated my position as a researcher in Chapter 3 (see 'Role of the Researcher') and exposed any biases that may have influenced data retrieval and analysis.

**Results**

The central research question for this study is, "From the perspective of the secondary school principals, what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative?" Data from the interviews of three administrators, who were directly involved with and who shared their impressions and experiences with the implementation of the eCAL 1:1 initiative, provided the answer to the research question. After carefully analyzing the responses of the principals, the data revealed that the factors that affected implementation of the laptop technology under the eCAL 1:1 initiative were aligned with the themes of program implementation, technology integration, role of the principal; and training and professional development.

**Program Implementation**

The MoE was mentioned nine times throughout the interview data. I considered the Ministry to be a factor supporting the implementation of the 1:1 initiative, as the Ministry provided the laptops, facilitated workshops, as well as training and professional development to administration and teachers. It also provided policy to guide program implementation. The contact assigned to me by the Ministry informed me that the MoE did not have many documents pertaining to the program and that there were no evaluations of the program. The contact explained that the MoE would not comment on the success of the eCAL 1:1 laptop initiative, and that I would have to glean that information from the principals.

The contact at the Ministry emailed copies of five documents concerning implementation of the 1:1 laptop program for analysis. One untitled document confirmed that the MoE provided 17,300 laptops to secondary schools. The "Implementation Strategy Framework for Laptops for Students" (MoE, 2010) detailed plans to roll out the 1:1 laptop intervention along with plans to monitor and evaluate the initiative. The other documents provided information regarding how the 1:1 initiative should affect the process of teaching and learning, strategies for managing the laptops, and a plan for training and development. These documents confirmed that the role that the MoE played concerning program execution was a factor supporting implementation of the 1:1 laptop initiative. The documents confirmed that the MoE had a vision for the initiative; a strategy for the roll out; and that the Ministry communicated the goals, guidelines, and strategies via these documents.

However, none of the documents provided by the MoE indicated that the eCAL 1:1 laptop initiative was ever evaluated. All three principals indicated that they did not evaluate the progress of the program. I considered a lack of formative or ongoing assessment of the eCAL program to be a factor that was a challenge to the implementation of the 1:1 laptop initiative. There was no indication that the success or lack thereof was measured at any point during program implementation to determine what improvements or changes needed to be made.

The Heads of Department (HoDs) were also a factor that supported program implementation, as they were mentioned five times throughout the data in reference to

training, encouraging the teachers to incorporate the laptops in their process of teaching and learning, and assisting in communicating the vision and intentions of the Ministry and the principals for program implementation. One of the principals stated that the HoDs at her school received training prior to the teacher training. Another principal explained that program expectations were shared with the HoDs before the teachers received that information. These impressions would suggest that the HoDs were essential to the process of implementing the laptop program. Documentation received from the MoE targeted HoDs for training and professional development. Analysis of the eConnect and Learn Programme Policy (MoE, 2010) revealed that the HoDs, along with the vice principals and principals were responsible for oversight of the implementation of the 1:1 laptop initiative (p. 10, section 10.6). It would be useful, therefore, to explore and add the impressions and experiences of the HoDs to the ongoing discussion regarding implementing 1:1 laptop technology in secondary schools in Trinidad and Tobago.

Creating an environment of change was a factor that supported program implementation as the Ministry, HoDs, and the principals provided, monitored, and shared ICT policies and guidelines to prepare the teachers for program implementation and to guide the teachers through the process. Sharing the vision for the program is essential to acquiring teacher buy-in and support for the program, and, as such, was a factor that supported program implementation. Committees, including IT personnel, parents, teachers, and administration were created and meetings were held to prepare and inform teachers. In light of creating an environment of change, P1 also mentioned that

parents signed contracts upon receiving the laptops for their children. The eConnect and Learn Programme Policy (MoE, 2010) and other documents provided by MoE confirm that the Ministry did provide documents to support program implementation and to create an environment of change.

The principals' perceptions of program implementation were both a support and a challenge. P3 explained, "The idea was good and the initiative may have been necessary and well intentioned…", however, she expounded, "the process was a bit flawed. The roll out smacked more of politics than enhancing the teaching/learning process" (P3). In addition to being "too politicized," P3 commented that program implementation was "No great success" and it was "not very effective." The other principals remained neutral when commenting on the implementation process. One principal explained that "it is difficult to say what success was achieved" (P1), and the other stated that implementation was "ongoing" (P2). Overall, the frequency of unfavorable perceptions of program implementation outweighed the favorable comments by an average of 4:1 and as such presented itself as more of a factor that challenged program implementation than a support.

Technical issues and a lack of technical infrastructure were also factors that challenged program implementation. P1 explained that the "school was not equipped electrically to support the use of these devices. Charging of the devices was an issue." P3 also cited "technical issues" as one of the challenges to program implementation. An

additional challenge to program implementation that emerged from the data was theft of the laptops (P1) on and off school premises.

As such, regarding the theme of program implementation, the factors that affected implementation of the eCAL 1:1 laptop initiative in terms of supports included the principals' positive perceptions, the MoE, the HoDs, the environment of change that was cultivated, and communication of the vision to the secondary school teachers. The factors affecting implementation of the eCAL 1:1 laptop initiative in terms of challenges were the principals' unfavorable perceptions, lack of a program evaluation, technical issues, a lack of technical infrastructure, and theft of the laptops.

**Technology Integration**

In keeping with the theme of technology integration, two main factors supported implementation: ICT competency and teacher support. One of the principals had a bachelor's degree in Information Technology and mentioned that, while the teachers were waiting to be trained, she encouraged them to incorporate the laptops into their practice "by example" (P2). P1 mentioned that there were a few teachers at her school who were ICT competent and that they were members of an ICT committee that was formed to help with program implementation. Overall, the principals revealed that they encouraged the teachers at their schools to integrate the technology into their lesson plans. P3 stated that she encouraged the teachers, "to embrace the new concepts" and in similar fashion, P2 disclosed that she "wanted to get teachers comfortable with the new ideas." Both principals declared that in order to mitigate the challenge of teacher low self-efficacy

concerning integrating the laptops into lesson plans; they offered more support to encourage the teachers. P1 and P2 mentioned that they insisted that the teachers integrate the laptops into their lesson plans.

Again, in accordance with the theme of integrating technology, three main factors presented a challenge to implementing the 1:1 laptop initiative: non-educational use of the laptops, low teacher self-efficacy, and the students' refusal to bring the laptops to school. P1 and P2 explained that one of the challenges they encountered was the students using the laptops for viewing pornographic content, gaming, and cyberbullying. P3 added that the "Students did not bring the laptops to school." P2 and P3 agreed that teachers at their schools were not comfortable with the technology. P3 elaborated that teachers were not comfortable incorporating the devices into their lesson plans and explained that the laptops were used as "an add-on."

**The Role of the Principal**

The impressions and experiences of the participants revealed that the role of the principal included the receipt and distribution of the laptops to the students and staff of the schools, monitoring the implementation of the laptop program, and monitoring and securing the laptops from theft. These factors characterize the direct role that the principal played in the implementation of the 1:1 laptop initiative and directly support program implementation. Analysis of the eConnect and Learn Programme Policy (MoE, 2010) confirmed the interview data regarding the role the principals described. The document stated, "Principals are responsible for oversight of the implementation of the

eCAL policies and procedures in their schools, managing the process, and for reporting their evaluation to the School Supervisors III" (p. 9, section 10.5).

The principals, however, may have played a minimal role in implementing the initiative. Regarding her experience implementing the program, P3 stated, "I had limited involvement." P3 added, "My role was to assist with the distribution and monitor implementation through the heads of departments." P1 stated that most of her energy was spent monitoring laptop usage outside of the classroom.

Another factor that supported program implementation was that all the principals had a vision for the 1:1 laptop initiative (see Table 5). The principals spelled out their common visions for the laptops to be used to enhance the process of teaching and learning. P2 and P3 envisioned technology and curriculum integration from the vantage point of the teachers while P1 described her vision for the initiative from that of the student. The principals' vision of positive outcomes of the 1:1 laptop initiative is a factor that supported the implementation of the 1:1 laptop program. In this case, the role of the principals in terms of having a positive vison for the program and the leadership role in receiving, distributing, and monitoring implementation of the initiative and the laptops were factors which supported implementation of the 1:1 laptop initiative.

**Table 5**

*First Cycle Coding for Question about Principal's Vision for the Initiative*

| Principal | Quote |
| --- | --- |
| P1 | I envisioned students having an even playing field. It was the intention for the laptops to be used by students to support their academic pursuits. |

| | |
|---|---|
| | I envisioned a laptop not being treated as [a] novelty but a resource that would enable research and development of ICT skills. |
| P2 | Our vision was that with the distribution of the laptops we would have an ICT integration curriculum throughout the school with the necessary training for teachers. |
| P3 | I envisioned a program where teachers would be trained to seamlessly implement technology in teaching and learning thereby transforming the traditional classroom environment. |

**Training and Professional Development**

The third cycle of coding revealed that the principals referred to the concepts of training and professional development most frequently when relating their impressions and experiences of implementing the laptop technology under the eCAL 1:1 program. Training and professional development was a factor that supported program implementation and presented itself as a challenge to implementation. For example, P1 explained, "Some short training in courses in basi[c] applications was done targeting teachers who had no ICT experience." While training teachers was a factor that supported program implementation, the courses were described as 'short', and the focus was basic training. There was no mention that the courses were designed to train teachers to incorporate the technology into the lesson plans that would support P3's statement that the devices were used as an 'add-on'.

P2 commented that the teachers at her school started receiving professional development and training in 2017, which was seven years after the roll out of the eCAL program. The teachers attended workshops specifically designed to educate teachers

about ICT integration and differentiating instruction. When asked whether there was anything that the principals wanted to add, P2 stated, "I believe the [MoE] should conduct more [eConnect] training sessions for all teachers." P3 explained that some training was provided for teachers and added, "Technology training at the school was ongoing." According to the data, only one of the principals attended a workshop that she described as "Not really effective" (P3).

Overall, the principals acknowledged that some of the teachers were supposed to receive training courses facilitated by the MoE and that a number of the teachers did receive some training to help them to incorporate the use of the laptops in their process of teaching and learning. The principals, however, received little to no training, a factor that was a challenge to implementation of the 1:1 laptop initiative. The principals' comments about training throughout the interview data signified that either training was not received or more training was needed, which further illustrated the importance of this factor to the implementation of the 1:1 laptop initiative.

The eConnect and Learn Programme Policy (MoE, 2010) stated that "Training and professional development of teachers and administration are fundamental components of a successful laptop program" (p. 7, section 9.5). The document further expressed that, "the Ministry of Education shall provide training and professional development to teachers and administrators not only on technical skills but also on curriculum integration" (p. 7, section 9.5.1). One of the documents from the MoE supported this observation of the importance of training as a factor that influenced the

implementation of the 1:1 laptop initiative. "An ICT Professional Development Implementation Plan for Educators in Trinidad & Tobago" (MoE, n.d.) detailed the vision for training the teachers, "To develop a coherent and sustainable approach to teacher ICT professional development so that, through effective pedagogy and integration of ICT, learners are able to embrace technology and become globally competitive knowledge workers" (p. 4). This document mirrored the vision of the principals for technology integration and the desire that the teachers be trained to do so. The professional development plan outlined a 4-year strategy involving teachers, IT staff, and administration including principals and vice-principals. The plan offered four training courses for teachers as opposed to one course for administrators with enrollment projections for upward of 12,000 teachers and 2,300 administrators. These projections support the principals' impressions that some teachers received training while the principals received little to no training.

## Summary

The results of the research show that the answer to the question regarding what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative from the perspective of the secondary school principals can be separated into two parts: factors that supported the implementation of the initiative and factors that presented a challenge to implementation of the initiative (see Table 6).

**Table 6**

*Factors that Affected Implementation of the eCAL 1:1 Laptop Initiative*

| | |
|---|---|
| Supports | The role of MoE |

| | |
|---|---|
| | The role of HoDs |
| | Environment of change: |
| |     1. Sharing the vision |
| |     2. Policies and Guidelines |
| |     3. ICT committees |
| |     4. Meetings |
| | Principals' positive perception of program implementation |
| | The role of the principal |
| | Principals' Vision |
| | ICT competent personnel |
| | Teacher support |
| | Training and professional development |
| Challenges | Lack of formative or ongoing program evaluation |
| | Principals' less than positive perceptions |
| | Technical issues with the technology |
| | Lack of technical infrastructure |
| | Laptop theft |
| | Non-educational use of the laptops |
| | Students did not bring laptops to school |
| | Teacher low self-efficacy |
| | Lack of training for principals |

In Chapter 5, I will discuss the results presented in this chapter and position the results of this study in the current body of literature concerning implementing a 1:1 laptop initiative in secondary school process of teaching and learning. Chapter 5 will explore the results of this study within the parameters of the conceptual framework of the six essential elements for the successful implementation of a 1:1 laptop initiative. Finally, I will discuss the relevance of this study and implications for future research.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this basic qualitative study was to explore and gain a better understanding of what factors affected the implementation of the laptop technology under the eCAL 1:1 initiative from the perspective of secondary school principals in Trinidad and Tobago. The study was conducted to determine why, after the government spent $83 million USD (Severin & Capota, 2011) on the roll out, the implementation was deemed to be less than successful. In addition, the study was conducted to get the impressions and experiences of school leaders, as the current literature on the subject only examined the 1:1 initiative from the perspectives of teachers and students. The results of the study found that the factors affecting implementation of the technology under the eCAL initiative both supported and challenged implementation. These factors will be explored through the lens of the conceptual framework outlined in Chapter 2 and within the context of current literature on the subject of the eCAL initiative.

**Interpretation of the Findings**

The study revealed that the factors affecting implementation of the laptop technology under the eCAL 1:1 initiative were bound by the categories of supports and challenges. The factors supporting the program's implementation were the roles of the MoE, HoDs, principals, and ICT competent personnel; creation of an environment of change; the positive perceptions of the principals; the principals' vision; teacher support; and training and professional development. The factors presenting a challenge to program implementation were a lack of formative and ongoing program evaluation; principals'

less than positive perceptions; technical issues; poor technical infrastructure; theft; non-educational use of laptops; not bringing laptops to school; teachers' low self-efficacy; and lack of training for principals. After determining the factors that affected implementation of the 1:1 initiative, the study will now explore these results within the parameters of the conceptual framework of Hall & Hord's (2015) six essential functions of effective change facilitators. The essential functions are as follows:

1. Developing, articulating, and communicating a shared vision of the intended change

2. Planning and providing resources

3. Investing in professional learning

4. Checking progress

5. Providing continuous assistance

6. Creating a context supportive of change

**Developing, Articulating, and Communicating a Shared Vision of the Intended Change**

Hall and Hord (2015) proposed that clear and consistent communication of a vision for change is necessary for successful implementation. For the purpose of this study, the principal was considered a change facilitator and was one of the factors that affected program implementation as a support. The principals in this study detailed their shared vision of the intended change and communicated this vision with the teachers via the HoDs and meetings. The principals shared a vision for successful integration of the

laptop technology and as such supported program implementation. This finding is consistent with research illustrating that it is necessary for the principal to communicate a shared vision to obtain teacher buy-in and to support program implementation (Afshari et al., 2008, 2009; Apsorn et al., 2019; Blau & Shamir-Inbal, 2017; Christensen et al., 2018; Claro et al., 2017; Dexter & Richardson, 2020; Dexter et al., 2016; Francom, 2020; Islam & Grönlund, 2016; Milman, 2020; Pautz & Sadera, 2017; Tondeur et al., 2017; Uğur & Koç, 2019).

This study's finding that MoE was also influential in developing a shared vision of the intended change, and that they communicated this vision through the principals, HoDs, and official documents corroborates Jaikaran-Doe et al.'s (2016) study. Contrary to the results of this study, Onuoha et al. (2015, 2016) found that teachers claimed that they did not receive very much information about the eCAL initiative. This disparity between the findings of this study and Onuoha et al.'s (2015, 2016) research warrants further investigation regarding how effectively the vision was communicated to the secondary teachers of Trinidad and Tobago. The data of the current study indicated that the vision was shared via meetings and print media, however, Pautz et al.'s (2015) research showed that successful implementation requires a greater effort in terms of using social media, print, and electronic resources. Perhaps more avenues were required for successfully sharing the vision for implementation of the eCAL initiative.

HoDs were not mentioned in the current literature on the eCAL initiative, however, the data revealed that these educators played a beneficial role in the roll out of

the 1:1 initiative. The HoDs assisted in communicating the goals for the program and guidelines for implementation. The hierarchical structure of authority in the secondary school system places HoDs above teachers. This position and their mention by the principals in the interviews implied that their input would be invaluable to the ongoing discussion of technology integration in the educational environment of Trinidad and Tobago.

**Planning and Providing Resources**

Hall and Hord (2015) proffered the idea that successful and sustained change requires that facilitators provide the necessary resources to support implementation. Research supports the validity of this function (Chang, 2012; Mwadulo & Odoyo, 2020; Oliver et al., 2012; Ye, 2000). This study found that MoE played a supportive role in the execution of the 1:1 laptop initiative by providing the necessary hardware and software to teachers, administrators, and staff, as well, as the necessary documents to guide program implementation. This finding corroborates Ogunshola & Adeniyi's (2017) claim that the government's provision of effective policies is a key element of successful ICT implementation (p. 130). This finding is also consistent with literature on the eCAL initiative that stated that MoE provided the necessary software and hardware to facilitate the roll out of the eCAL initiative (Briggs & Blair, 2016; Harry & Mitchell, 2015; Jaikaran-Doe et al., 2016; Maharaj-Sharma et al., 2017; Onuoha et al., 2015, 2016). The current study discovered that the principals also played a supportive role in the program roll-out by distributing the technology to the students and staff.

Hall and Hord (2015) expanded this argument to explain that a lack of planning and provision of resources is a contributing factor to unsuccessful implementation of change initiatives. Mwadulo and Odoyo (2020) also supported this argument and cited poor planning as a barrier to successful ICT implementation. This study found that, although the laptops were provided, lack of technical infrastructure, technical issues with the laptops, non-educational use of laptops, students not bringing laptops to school, and securing the laptops from theft presented challenges to program implementation and sustainability. These findings are consistent with Briggs and Blair's (2016), Maharaj-Sharma et al.'s (2017), and Onuoha et al.'s (2015, 2106) claims that faulty equipment; a lack of bandwidth to support the use of the laptops in school; students not taking laptops to school; students using the devices for gaming, cyberbullying, and pornography; a lack of storage to secure the laptops from theft; and a lack of technical support personnel were barriers to successful implementation of the 1:1 initiative. Onuoha et al. explained that when laptops were damaged, they were not repaired, which parallels the principals' claim about issues with charging and maintaining the devices. These issues challenged program implementation, as it would be difficult for teachers to integrate the laptops into their practice of teaching when the students did not bring the technology to school, the computers were stolen or damaged beyond repair, there were Internet connectivity issues, or there was not enough IT support staff.

Briggs and Blair (2016) and Onuoha et al. (2015, 2016) found that a lack of planning was a challenge to successful implementation of the 1:1 initiative. The current

study corroborated this finding as the principals indicated that nothing was done to prepare for the roll-out other than the formation of ICT/technology committees to guide the process, adding that the roll-out was sudden and also politically charged. Overall lack of planning and an absence of resources (other than the laptops) were challenges to the implementation of the 1:1 laptop initiative and were contributing factors to why the program was deemed less than successful in the current study and in the literature on the eCAL program (Briggs & Blair, 2016; Onuoha et al., 2015, 2016). Harry and Mitchell's (2015) findings provided a stark contrast to these claims in their assertion that the teachers were provided with the necessary resources to facilitate successful implementation of the eCAL initiative in some schools. This disparity in the research warrants further study to determine whether the impressions of the five teachers in Harry and Mitchell's study reflect the impressions of a larger number of secondary school teachers in Trinidad and Tobago.

**Investing in Professional Learning**

This study is consistent with the literature in recognizing that MoE provided training and professional development to some teachers and administrators (Briggs & Blair, 2016; Harry & Mitchell, 2015; Jaikaran-Doe et al., 2016; Maharaj-Sharma et al., 2017; Onuoha et al., 2015, 2016). The supporting documents retrieved from MoE indicated the Ministry's intention to provide training for teachers and administrators regarding basic technical abilities and ICT integration. Therefore, the literature confirms the result that MoE played a supportive role in the execution of the 1:1 laptop initiative

by facilitating training for teachers and administrators and providing documents to guide program implementation and training.

In contrast, the aspect of professional training and development was also found to be a factor that challenged implementation of the 1:1 initiative. The current study found that while some teachers received basic training on operating the laptops, they needed further training on how to integrate the laptop technology into the curriculum. This result is corroborated by this study's finding that some of the teachers experienced low self-efficacy regarding incorporating the technology in their lesson plans. These results are in accordance with the literature that proposed that limited training and teacher low self-efficacy challenged the successful implementation of the eCAL 1:1 initiative (Briggs & Blair, 2016; Jaikaran-Doe et al., 2016; Onuoha et al., 2015, 2016). Additionally, this study also found that the principals received little to no training and so were less able to support teachers in integrating the technology into the curriculum.

Overall, a lack of knowledge of how to integrate the laptops into the curriculum would be a barrier to successful implementation of the eCAL initiative. While some teachers could use the technology to enhance basic functions, such as communicating via email and presenting information, they did not have the confidence to use the laptops as more than an "add-on" (P3). Teachers could not rely on their principals to support them in this endeavor since the principals were also not fluent in this regard. Professional development as a factor was mentioned with the greatest frequency throughout the

interview data indicating, early in the study, that this element was a strong factor that affected implementation of the eCAL initiative.

Hall and Hord (2015) advised that principals provide necessary and ongoing training for teachers in order to successfully implement a 1:1 initiative. The researchers explained that learning is "the basis of and corollary to change" (Hall & Hord, 2015, p. 33). Research further advanced the knowledge that the 1:1 initiatives were unsuccessful in schools in which teachers were not provided with adequate training to integrate technology into the curriculum and experienced low self-efficacy in this regard (Afshari et al., 2009; Leonard & Leonard, 2006; Machado & Chung, 2015; Tarman et al., 2019; van Niekerk & Blignaut, 2014). Research also supports the idea that principals who lack knowledge, training, and self-affect regarding ICT integration are a contributing factor to the unsuccessful 1:1 program implementation (Afshari et al., 2009; Anderson & Dexter, 2000; Chang, 2012; Fisher & Waller, 2013; Flanagan & Jacobsen, 2003; Hsieh et al., 2014; Shepherd & Taylor, 2019; Thannimalai & Raman, 2018a, 2018b; van Niekierk & Blignaut, 2014).

**Checking Progress**

Hall and Hord (2015) posited that systematic and ongoing program evaluation is essential to successful change implementation. The researchers maintained that continuous monitoring and evaluation would uncover progress or lack of progress of the initiative and allow principals to troubleshoot any issues; thereby enhancing progress. This study revealed that there was no systematic, ongoing evaluation of the eCAL 1:1

initiative, making this a factor that challenged program implementation. This finding is consistent with research on the eCAL initiative (Briggs & Blair, 2016; Onuoha et al., 2015, 2016). Briggs and Blair (2016) opined that this oversight contributed to the impression that the eCAL 1:1 initiative was considered to be "an event and not a process" (p. 556). If the program were evaluated, stakeholders and leadership could better strengthen the factors supporting program implementation and determine how to best mitigate the factors that challenged program implementation.

**Providing Continuous Assistance**

Hall and Hord (2015) explained that principals need to provide the necessary supports and resources to facilitate successful change implementation. This study found that stakeholders, including MoE, HoDs, and principals, provided support for teachers in terms of the hardware, software, and policies and guidelines to assist with implementation of the eCAL initiative. The principals played a major role in this endeavor by continuously encouraging teachers so that they would feel comfortable using the laptops and incorporating the devices in their teaching practice. This finding is consistent with Harry and Mitchell's (2015) study, which concluded that "the principal played a key role in teachers' attempt to implement the eCAL curriculum change initiative" (p. 1064). The researchers added, "having the necessary resources eased the burdens of implementation" (p. 1064).

This finding also aligns with the literature about schools that experienced successful 1:1 program implementation. These studies revealed that one main factor

affecting successful program execution was continuous support from the principal (Afshari et al., 2008, 2009; Chang, 2012; Pautz et al., 2015). Claro et al. (2017) surmised that the schools in their study would have experienced successful program implementation if support from the principals was effective and ongoing.

**Creating a Context Supportive of Change**

In addition to offering continuous support, Hall and Hord (2015) added that it is necessary for principals to create an environment that supports change to enable successful change implementation. This study found that the principals created a culture of change by sharing their vision for change, creating committees consisting of ICT competent teachers and technicians to support teachers, and creating and disseminating policies and guidelines to assist teachers. One of the principals mentioned having parents sign contracts when taking possession of the laptops. This strategy exemplified how the principals were preparing the learning community for change as they prepared parents to be a part of the process. Creating an environment of change in this manner was found to be a factor that supported implementation of the eCAL 1:1 initiative thus corroborating the results of studies that determined that a context supportive of change is an essential factor to effect successful implementation of a 1:1 initiative (Afshari et al., 2009; Chang, 2012; Hayes & Greaves, 2013; Islam & Grönlund, 2016; Korumaz, 2016; Pautz et al., 2015; Prasojo et al., 2018; Richardson et al., 2021; Sterrett & Richardson, 2020a, 2020b; Uğur & Koç, 2019).

One element of creating a culture of change is embracing the change. In this regard, this study found that the principals' less than positive perceptions of the execution of the eCAL initiative was a factor that challenged implementation. The principals shared positive perceptions in terms of their vision for successful ICT integration into the curriculum, appropriate training for teachers, transforming the traditional classroom and development of 21$^{st}$ century skills in the practice of teaching and learning. While a shared vision was found to be a factor supportin implementation of the actual eCAL 1:1 initiative, their less than positive impressions and perceptions of the eCAL initiative implementation portrayed a sharp contrast to their pre-implementation vision. The principals found the roll-out to be a tiresome and laborious undertaking involving anxiety for security of the laptops. Implementation was described by the principals as sudden, flawed, political, and less than successful. Since creating a context of change supports program implementation, any resistance to change from the principals would challenge program execution.

**Limitations of the Study**

A limitation to this study was the number of participants. The original target number of participants was six, as this was the number that could contribute to saturation (Fusch & Ness, 2015; Guest et al., 2006). However, only three participants responded after numerous requests. This number could affect transferability of the data making it more difficult for readers to see an example of their own situation in this context. The

number of participants could also influence the credibility of the data in terms of being a true reflection of the factors that affected the implementation of the eCAL 1:1 initiative.

Another limitation was the method used to conduct the interviews. The participants seemed to prefer the email method so they could respond at their pace and convenience (Brampton & Cowton, 2002; Gibson, 2010; McCoyd & Kerson, 2006). However, I had to send many reminders to get initial responses and it was nearly impossible to get responses to follow-up questions. This situation could impact the dependability of the data to be real and information-rich (Anney, 2014; Patton, 2015; Shenton, 2004). The participants may not have given the email interviews the necessary time and attention to thoroughly explain their experiences and impressions, and they did not provide the opportunity to seek immediate clarity on some of the information.

The occurrence of the COVID-19 pandemic presented another limitation for this study. Schools abruptly shut down throwing potential participants into a state of extreme concern. The pandemic affected the number of respondents and may have influenced the quality of the responses that were received. The participants could not return to their offices and were, therefore, unable to retrieve any documents they may have had pertaining to the launch of the eCAL 1:1 initiative, leaving only the documents sent from the MoE with which to triangulate the interview data. This could impact authenticity and confirmability of the data as a true representation of the roll out of the initiative.

**Recommendations**

This study informs the literature regarding the implementation of 1:1 initiative in the context of the educational arena in developing nations. Considering the limitations of this study, I would recommend that further research be conducted with a larger sample and in a face-to-face setting. There is much knowledge to be gained from interviewing principals and other stakeholders in the educational community, such as the HoDs.

The face-to-face setting would give the researcher the ability to ask on the spot follow up questions and gain immediate clarity on the data. The researcher could also gain valuable insights from observing participants' non-verbal cues. The demographic parameters of the study could be extended to include the HoDs. HoDs were mentioned frequently in this study, which leads me to believe that this demographic also represents essential members of the leadership community who played a significant role in the implementation of the eCAL initiative. Their perceptions and experiences would be invaluable to the study of technology integration in this and similar cultural contexts. Another suggestion for future research would be to examine the impressions of school leaders and teachers about the value and importance of a 1:1 initiative in light of continuing educational practices in the midst of and post COVID-19.

**Implications**

The literature concerning the eCAL 1:1 laptop initiative in Trinidad and Tobago reflects the perspectives of the teachers and students. The voice of the principal, as a school leader and facilitator of change implementation, was lacking in the study of the

eCAL initiative. This study fills that gap in the literature. The findings of this study could inform stakeholders in presenting valuable information that could fuel data-driven decisions regarding policies and change that affect the educational community in the country of Trinidad and Tobago. The research responds to the concern that decisions about policy and change, often involving considerable time and monetary investments, are made without the support of data. This study offers empirical evidence in the form of direct knowledge of the implementation of a 1:1 initiative that could be useful to stakeholders in the educational environment of Trinidad and Tobago and governments and decision makers in similar cultural contexts.

This study supports positive social change through the promotion of an agenda to effectively and sustainably integrate technology into the educational framework of Trinidad and Tobago. I plan to disseminate this study in the form of a whitepaper, as the findings of this study could provide valuable information about what factors support and challenge change implementation in the educational system of Trinidad and Tobago. This knowledge is key to making decisions about how to focus on the factors that support successful implementation. Awareness of the challenges to implementation is essential so that stakeholders can make decisions about how to best mitigate these issues.

This research was conducted with the goal of influencing success in future attempts to integrate ICT in the practice of learning and instruction in Trinidad and Tobago and similar educational environments throughout the Caribbean and Latin America. As such, I am advocating for social and economic advancement of a

technology-savvy culture in the promotion of academic achievement, provision of fair and equal access to a quality education, and the development of 21st century practices in the classroom.

## Conclusion

This basic qualitative study was conducted to investigate what factors affected implementation of the eCAL 1:1 initiative in Trinidad and Tobago from the perspective of the principal. The study found that there were factors that both supported and challenged implementation of this initiative. The findings were consistent with research on the 1:1 initiative and provided suggestions for future research on this topic. The goal of the study was to provide valuable data and knowledge for stakeholders and to inform future endeavors to implement similar initiatives in Trinidad and Tobago and comparable educational contexts throughout the Caribbean and Latin America.

In essence, the study of technology integration into school curriculum will be ongoing, as technology is dynamic and constantly progressing. We cannot ignore the value of technology in the educational landscape particularly with the advent of COVID-19. This pandemic affected the educational environment in ways that are worthy of study. Without technology, however, it is nearly impossible for learners to access educational content. The principals informed me that schools were shut down because both schools and students lacked the technology infrastructure and technical access to continue learning virtually. Society turned to technology to facilitate political, business, social, and educational activities. It is, therefore, imperative that stakeholders pursue avenues for

successful ICT integration in schools in Trinidad and Tobago and developing nations.

The findings of this study can move these efforts forward to the benefit of all.

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Appendix A: Interview Protocol

The interviews were conducting by means of email. I sent a consent to participate form to the participants in which I introduced myself and explained the study and why I was conducting the study. Upon receiving consent by email, I forwarded the interview guide including the interview questions as seen below.

**Introductory Statement**

Hello, thank you for consenting to this interview. Allow me to re-state the purpose of this interview. I am conducting research on the implementation of the eConnect and Learn 1:1 government laptop program. I would like to learn about some of your experiences while facilitating the implementation of the program. Please be assured that your name and identity will not be revealed in the study, only the information that you willingly share. However unlikely, be aware that I am legally bound to share any information that reveals criminal intent or occurrence. Please respond to the questions below with as much detail as possible. Please provide as many examples as you can.

**Interview Questions**

1. Tell me about your experiences implementing the eConnect and Learn (eCal) laptop program.

2. How did you communicate your vision of change to the teachers and staff at your school?

3. What supports did you provide to aid in implementing the eCal initiative?

4. What measures were taken to prepare for implementing the eCal laptop program?

5. How much professional development did the teachers receive?

6. How did you evaluate progress as the program was being implemented?

7. What challenges, if any, did you encounter when implementing the program?

8. What provisions were made to overcome any challenges that may have occurred?

9. What measures did you take to create an environment of change at your school?

10. Is there anything that you would like to add or that you think I should know about implementing this program?

**Closing Statement**

I would like to take this opportunity to thank you for your cooperation and support. Please contact me at (678) 644-1689 or e-mail me at vida.martin@waldenu.edu if you recall anything you would like to add. Thank you again for your participation.

Appendix B: Research Database

The table below illustrates the material saved to an electronic database that was developed and managed for the current study. The electronic database includes the interview guide, interview data, documentation, coded data, data analysis spreadsheets, and researcher notes. All data maintain the anonymity of the participants. The database may be furnished upon request.

**Research Database Table**

| Document | Save Code |
| --- | --- |
| IRB approved Consent Form | Rsch.06132021.Martin.ParticipationConsentForm |
| MoE approval letter | Rsch.06132021.Martin.GoRTT_MoE.ApprovalLetter |
| P1 interview data | Rsch.06132021.Martin.INT.P1 |
| P2 interview data | Rsch.06132021.Martin.INT.P2 |
| P3 interview data | Rsch.06132021.Martin.INT.P3 |
| P1 color coded interview data | Rsch.06132021.Martin.INT.P1,ColorCoded |
| P2 color coded interview data | Rsch.06132021.Martin.INT.P2,ColorCoded |
| P3 color coded interview data | Rsch.06132021.Martin.INT.P3,ColorCoded |
| Color Coded Table Excel Spreadsheet | Rsch.06132021.Martin.ColorCodedDataSpreadsheet |
| Second Cycle Codes Spreadsheet | Rsch.06132021.Martin.SecondCycleCodeDataTable |
| Data Analysis Tables and Notes Spreadsheet | Rsch.06132021.Martin.DataAnalysisTables_Notes |
| MoE Documentation | Rsch.06132021.Martin.MoE.eCALDocuments |
| MoE Documentation- Distribution List | Rsch.06132021.Martin.MoE.LaptopDistributionList |