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# Level of Technology Implementation and the Personality Traits of Adventist School Principals

Gustavo Martin  
*Walden University*

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# Walden University

College of Education

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Gustavo Martin

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## Review Committee

Dr. Donna Gee, Committee Chairperson, Education Faculty  
Dr. Tianyi Zhang Ulyshen, Committee Member, Education Faculty  
Dr. Shereeza Mohammed, University Reviewer, Education Faculty

Chief Academic Officer  
Eric Riedel, Ph.D.

Walden University  
2019

Abstract

Level of Technology Implementation and the Personality Traits  
of Adventist School Principals

by

Gustavo Martin

MA, Aquinas College, 2005

BS, Aquinas College, 2001

Dissertation Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Philosophy  
Educational Technology

Walden University

March 2019

## Abstract

Previous studies analyzed how personality traits relate to education, but not in relation to technology implementation. Limited knowledge can lead to inadequate professional development. This study provided insight on the “level of technology implementation” (LoTi) and the personality traits of private school principals. The theoretical frameworks of this research were the Big Five Personality Trait Model and Concerns-Based Adoption Model. The research study answered the question of the relationship, using Kendall’s Tau-b, between the LoTi and each of the personality traits: extraversion, openness, conscientiousness, neuroticism, and agreeableness of Adventist school principals using a quantitative, non-parametric, correlational study approach. Every Adventist school principal within North America (N=799) were invited to participate. Sixty-six completed the LoTi Digital-Age Survey for Leaders and the Big Five Inventory. Findings indicated that a weak-moderate correlation was found on the personality traits of extraversion ( $\tau_b = .253, p = .007$ ) and openness ( $\tau_b = .229, p = .017$ ); no correlation was found on the personality traits of agreeableness ( $\tau_b = .118, p = .215$ ), conscientiousness ( $\tau_b = .177, p = .063$ ), and neuroticism ( $\tau_b = -.157, p = .095$ ). It is recommended that future research studies include teacher’s personality traits and segregation of data by age or years of experience in education. Findings affected positive social change by providing information that could be used to provide appropriate professional development with less emphasis on trainings that focus on agreeableness, conscientiousness, and neuroticism and more on those that help principals be more open to both the process and the actual technological change.

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## Dedication

To our amazing God and creator. To my beautiful wife and friend, Heidi. To my sons, Kevin, Kenneth, and Nickolas. To my dad, Claudio Martin, who taught me in life to pursue the highest level of education possible and to never give up. To my uncle, Carlos Martin, for encouraging me to pursue a doctoral degree.

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## Chapter 1: Introduction to the Study

### **Introduction**

Providing a successful academic program can be considered as a result of an infinite number of reasons, one of them being the personality traits presented by school principals, as demonstrated by their behaviors and decision-making processes (Ali, Azizollah, Zaman, Zahra, & Mohtaram, 2011). Koehler, Mishra, and Cain, (2013) defined personality traits as the dimension of individual differences in tendencies to show consistent patterns of thoughts, feelings, and actions that influence the way people interact and make decisions on a daily basis. Traits can be directly related with psychosocial, professional outcomes, or even the overall level of satisfaction with life (Costa & McCrae, 2011; Lahey, 2009).

School principals have the responsibility of running the operations of the day-to-day school activities by providing the appropriate vision, training, support, and resources to all teachers and school staff (Levin & Schrum, 2014). In addition, a school principal must ensure that a positive school environment exists for student learning to take place (Levin & Schrum, 2014). In order to meet the needs of a school community, Yildizbas (2017) emphasized that it is important that school principals be aware of their own personality traits, skills, attitudes, and beliefs, which in return provide better chances of success (Yildizbas, 2017).

With the advancements of technology, the role and expectations of school administrators have changed in some ways. School administrators are now expected to

not only possess the knowledge about how to use technology effectively but identify which technologies will best fit the needs of the student population they are serving and how to properly train the teachers to implement them (Herrmann, Dragoset, & James-Burdumy, 2014). Richardson, McLeod, and Sauers (2015) suggested that if the use of technology for educational purposes is only seen as an add-on and not properly implemented at the classroom setting, the possibility exists that the students will not take full advantage of all its capabilities and find the use of such technology irrelevant in their lives.

This research study provides an insight on the level of technology implementation (LoTi) and the personality traits of Adventist school principals. Through the years, multiple research studies such as Admiraal et al. (2017), Berrett, Murphy, and Sullivan (2012), Hsieh, Yen, and Kuan (2014), Richardson et al., (2015), and Sincar (2013), to name a few, have analyzed topics surrounding technology implementations at the school setting, but even though few research studies have focused specifically on the role that personality traits of school administrators play in the implementation of technology (Barczyk & Duncan, 2017; Knezek & Christensen, 2016), many of them support the need to further examine the understanding of personality traits of school principals and the emphasis of technology implementation at the school setting (Barczyk & Duncan, 2017; Knezek & Christensen, 2016). Consequently, Ali et al. (2011) identified that personality traits can directly influence the performance of individuals in administrative positions. But in a society where technology influences all aspects of people's lives (Schneider,

Gruman, & Coutts, 2012), it is significant to understand how personality traits of school principals relate to technology implementation.

Results from the study provided valuable information by identifying each personality trait of the participating school principals and how each trait related to the LoTi. According to Di Fabio and Palazzeschi (2015), specific personality traits can be learned over time. The results contribute to the development and selection of professional development opportunities that correlate to the various personality traits, which could then improve the quality of instruction and technology implementation at the school level.

The research results affect positive social change by providing information that can be used in technology implementation training for administrators to improve the quality of the educational program. This study expands on previous research studies on similar topics by providing new knowledge and thus, contributing to closing the literature gap that currently exists regarding the personality traits of school principals and the LoTi (Ali et al., 2011; Knezek & Christensen, 2016).

This study was guided by an extensive literature review on topics such as a historical background of technology implementation in the educational field, technology and school administration, Big Five Personality Trait Model, CBAM theoretical backgrounds, and current research in technology leadership and school administration. Each section provides a foundation on which the study was based, shedding light on the findings and thus leading to the conclusions and final recommendations.

## **Background**

Twenty years ago, technology was considered an add-on service to the way of life in the workplace and home, evolving to a point of being considered indispensable.

According to the U. S. Department of Commerce (2016), a 65% increase on the accessibility of the internet in American homes has taken place between 2000 and 2011. As a result, new technologies have and continue to influence the educational system and the way students learn. According to a study by Sundeen and Sundeen (2013), 97% of teachers working in schools in the United States have a personal computer at their disposal in their classroom setting, 93% of them expressed having access to the internet and being required to use it not only for communication purposes but for instructional purposes. As technologies become more accessible, teachers and school administrators constantly seek creative ways to implement new instructional approaches to meet the academic needs of their students effectively (Herrmann et al., 2014).

School administrators play an important role in the implementation process of technology at the school level by not only the way they model and encourage technology use, but by their attitudes towards technology, which could be influenced by their personality traits (Csikszentmihalyi & Wong, 2014). Research studies have found that a direct relationship exists between the daily amount of technology used for instructional purposes at the school setting and the importance that school administrator places on it (McKnight, et al., 2016; Yu & Prince, 2016). Research studies support the need to further examine the understanding of personality traits of school principals and the emphasis of

technology implementation at the school setting (Knezek & Christensen, 2016). The purpose of this study was to contribute in closing the gap in the literature on personality traits of school administrators and the LoTi, and thus provide valuable information for school districts by helping them identify the appropriate support to school administrators in order for technology implementations to be successful.

### **Problem Statement**

Little is known about the understanding of personality traits of school principals and technology implementation at the school setting (Barczyk & Duncan, 2017; Knezek & Christensen, 2016). School districts requiring principals to implement technology at their schools without considering the principal's personal characteristics, such as personality traits, may impact the level of success of the technology implementation (Ikenouye & Clarke, 2018). Consequently, the academic program and student's academic success may be affected (Ikenouye & Clarke, 2018). The research problem identified by the research study is whether a relationship existed between the personality traits of Adventist school principals and the LoTi, a relationship that would provide information that could be used in the selection of adequate professional development opportunities.

In the educational field, there seems to be a misconception that the acquisition of technological devices and increased expenditures in technology automatically mean successful technological implementation and improved student academic scores (Cowie, Jones, & Harlow, 2011). Current research has demonstrated the importance of personality traits and the role of technology not only in our society, but also in the educational



system (Barczyk & Duncan, 2017; Halder, Roy, & Chakraborty, 2017; Richardson et al., 2015; Sincar, 2013). For example, Barczyk and Duncan (2017) found that students scoring high levels of the personality traits of agreeableness and extroversion, demonstrated a sense of classroom connectedness with technology in technology-enhanced classrooms, thus impacting the instructional approach of their teachers and classroom activities. Halder et al. (2017) identified how each of the personality traits affects the information-seeking behavior of students, particularly when technology was used by the instructor. Even though technology has impacted the way people think and live, not much has changed in the way students are being taught in the school setting, especially at the secondary level in the United States (Sincar, 2013). Financial limitations and budget cuts in the public and private school systems have forced administrators to find creative ways to academically prepare their students to be successful in the future (Richardson et al., 2015). Researchers, such as Banoglu (2011), Richardson et al. (2015), and Sincar (2013), suggested that school principals play an important role in the decision-making process of innovation and implementation of new instructional practices, including the use of technology. Consequently, studying the personality traits of school principals may expand the knowledge on the topic by providing information on the relationship between the personality traits of school principals and the LoTi. Limited studies currently exist on personality traits and technology implementation at the school setting (Csikszentmihalyi & Wong, 2014) requiring further research on the topic.

### **Purpose of the Study**

The purpose of this quantitative study was to provide insight on the LoTi and the personality traits of school principals in a private educational system in the United States. In the 21<sup>st</sup> century, the use of technology in the educational setting should be considered an essential component at all levels. Technology is an integral part of our lives, which, according to Dawson (2012), can provide benefits that exceed academics. Being technologically literate is something that all educators and school administrators must keep at the forefront (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). Throughout the years, many educational institutions, such as schools within the Adventist educational system, have tried to implement a wide range of technologies into their classrooms with different outcomes (Ertmer et al., 2012), but very few have focused on the personality traits of extraversion, openness, conscientiousness, neuroticism, and agreeableness of their school principals in relation to technology implementation. By identifying and analyzing the independent variable, personality traits, and the dependent variable, technology implementation, this study provided valuable information that school districts can use to guide the creation and selection of professional development opportunities, thus improving the quality of instruction and technology implementation.

### **Research Question and Hypotheses**

The following research questions guided this study:

RQ1: What is the relationship, using Kendal's Tau-b, between the level of technology implementation and each of the personality traits: extraversion, openness, conscientiousness, neuroticism, and agreeableness of Adventist school principals?

*H1<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of extraversion of Adventist school principals.

*H1<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of extraversion of Adventist school principals.

*H2<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of openness of Adventist school principals.

*H2<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of openness of Adventist school principals.

*H3<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of conscientiousness of Adventist school principals.

*H3<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of conscientiousness of Adventist school principals.

*H4<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of neuroticism of Adventist school principals.

*H4<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of neuroticism of Adventist school principals.

*H5<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of agreeableness of Adventist school principals.

*H5<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of agreeableness of Adventist school principals.

Within this study, all null and alternative hypothesis identified the independent variable, personality traits, and the dependent variable, technology implementation. A significant positive or negative correlation between the personality traits and the LoTi and the degree of prediction for each personality trait supporting or rejecting the alternative and null hypothesis, were measured. The findings addressed the gap stated in the problem statement and described the relationship between the personality traits of Adventist school principals and the LoTi.

### **Theoretical Foundation**

For the purpose of providing a theoretical foundation to the research study that broadens the understanding of personality traits and technology implementation, the Big Five Personality Trait Theory and the (CBAM) were used. The Big Five Personality Trait Theory proposes the idea that people are born with certain personality traits that, if correctly identified and nurtured, could result in positive outcomes such as enhanced relationships, understanding one's strength, and improving a person's way of life (Fleener, 2006). Derue, Nahrgang, Wellman, and Humphrey (2011), as well as Marsiglia (2005), concurred with this idea and suggested that leaders must understand their personality traits in order to accurately adapt to different situations. Further analysis of this theory suggested that specific personality traits can be also learned over time (Di Fabio & Palazzeschi, 2015). An examination of the Big Five Personality Trait Theory provided a framework for the personality traits aspect of the research question.

The five domains of the Big Five Personality Trait Theory are extraversion, openness, conscientiousness, neuroticism, and agreeableness. Extraversion is a trait demonstrated by those who tend to denote positive emotions. People who demonstrate extraversion engage with other individuals and, in general, tend to get enthusiastic about taking on new opportunities (Allen, 2015; Ryckman, 2012). Openness is a trait that involves intellectual curiosity to work with abstract concepts, such as in the professions of music, art, or production (Allen, 2015; Ryckman, 2012). Conscientiousness is the trait of being self-controlled and organized. People who demonstrate conscientiousness are

achievers, careful, and dutiful (Allen, 2015; Haslam, Reicher, & Platow, 2015; Ryckman, 2012). Neuroticism is the trait of being emotionally unstable, overreacting to everyday stressful situations, and having to deal with feelings of anger, depression, and anxiety (Allen, 2015; Chamorro-Premuzic & Furnham, 2014). Agreeableness is the trait that involves the ability to work in collaboration with others and look for ways to find social harmony (Allen, 2015). People with these individuals tend to be friendly, considerate, generous, honest, and trustworthy (Chamorro-Premuzic & Furnham, 2014).

The CBAM provided a theoretical foundation of the degree of technology implementation at the school level. The LoTi are a component of the CBAM, which provided valuable information on the levels of technology implementation according to any particular setting (Gundy & Berger, 2016; Knezek & Christensen, 2016). The LoTi dimension of the CBAM helped determine how well staff, individually and collectively, implement technology.

The LoTi included eight levels: are non-use, awareness, exploration, infusion, integration mechanical, integration routine, expansion, and refinement. The levels provide eight behavioral descriptors that demonstrate the actions of individuals as they progress through the implementation process and become acquainted with the innovation. Each level is described through a series of statements that exemplify the behavior that individuals demonstrate at each stage of the innovation process (Knezek & Christensen, 2016). The LoTi is influenced by the school principal's attitude towards technology, way of modeling, and encouraging technology use (Csikszentmihalyi & Wong, 2014). This

chosen theory directly tied to the technology implementation aspect of the research question.

### **Nature of the Study**

The chosen research design for the quantitative study was correlational. The design fits the purpose of identifying the personality traits of Adventist school principals and their connections with the LoTis. A quantitative research seemed appropriate because the intent of the study was to identify the statistical outcome to test the strength between the chosen variables. On the contrary, a qualitative research was not chosen because the research questions of the study were not intended to gather information about the opinions and personal interpretations of the factors involved in the phenomenon under study.

For the research study, the data were gathered from a potential of 799 principals who work in the Adventist educational system in North America. The Big Five Personality Trait Inventory was used to collect data on personality traits. The LoTi Digital Age Survey for Leaders was used to collect data on technology implementation. The LoTi survey was developed according to the Levels of Use of Innovation. The Levels of Use of Innovation are a dimension of the CBAM that deal with the levels of technology implementation through the creation of behavioral profiles using eight different levels to using technology (Hall, Dirksen, & George, 2013). Due to the factor of distance and the number of schools where the principals work, using an online survey

tool was the most appropriate approach to collect data. The chosen approach allowed the data to be efficiently collected and analyzed in a timely manner.

Based on Frankfort-Nachmias, Nachmias, and DeWaard (2015), a correlational design best fitted the intent of the research study by examining the relationship between personality traits and technology implementation. The research design facilitated the correlational analysis and determined whether any of the personality traits exhibit a significant relationship with the LoTi. The correlational research design allowed me to draw conclusions and make generalizations about the rest of the population (Field, 2009).

### **Definitions**

*Administrator:* A person responsible for making administrative decisions for the school (Deal & Peterson, 2016).

*Big Five:* The Big Five refers to the basic traits of personality evolving from the research of Fiske (1949), Norman (1967), Smith (1967), Goldberg (1993), and Costa and McCrae (2011). The Big Five Personality Traits are extraversion, openness, conscientiousness, neuroticism, and agreeableness. Extraversion is a trait in which individuals tend to denote positive emotions, enthusiastic, and like to engage with other individuals (Allen, 2015; Ryckman, 2012). Openness is a trait that involves being intellectually curious and working with abstract concepts, such in the profession of music, art, or production (Allen, 2015; Ryckman, 2012). Conscientiousness is the trait of self-control and being organized, careful, and dutiful (Allen, 2015; Haslam et al., 2015; Ryckman, 2012). Neuroticism is a trait that involves being emotionally unstable and



dealing with feelings of anger, depression, and anxiety (Allen, 2015). Agreeableness is the trait involving the ability to work well with others and find social harmony (Allen, 2015).

*Leadership:* The action of leading a group of people or organization (Jian & Fairhurst, 2017).

*Personality Trait:* The group of behavioral descriptors that are scientifically classified and interrelated (Costa & McCrae, 2011).

*Technology:* “The process of transforming basic knowledge into useful application” (Chien, 2013, p. 5).

*Technology Implementation:* The process for which technological tools are applied to enhance learning and problem solving (Howard & Thompson, 2016). For the purpose of the study, technology implementation is defined through the lenses of the Levels of Use of Innovation, a component of the CBAM. The levels of use of technology are nonuse, awareness, exploration, infusion, integration mechanical, integration routine, expansion, and refinement. At the non-use level, the use of technology is non-existent. At the awareness level, the use of technology is limited and used for the purpose of enhancing teacher lectures. At the exploration level, the use of technology is used by students for extension activities. At the infusion level, the use of technology is used by students to carry out teacher-directed tasks. At the integration, mechanical level, the use of technology is motivated by the desire to answer student generated questions. At the integration, routine level, technology is used at the teacher’s comfort level that promotes

an inquiry-based model of teaching. At the expansion level, the use of technology is more complex and sophisticated. At the refinement level, the use of technology extends beyond the classroom setting and promotes an authentic real-world problem-solving teaching approach (LoTi Connection, 2018).

*Trait:* A distinguishing quality or characteristic, typically one belonging to a person (Jian & Fairhurst, 2017).

### **Assumptions**

For this research study, I assumed that the decision-making process made by school principals, who are further away from the actual technology implementation process compared to those in the classroom setting, are shaped by their own personality traits and experiences. Furthermore, I assumed that the technology implementations were guided by a particular set of personality traits possessed by the school principals that can be measured using a standardized survey. Also, assuming that the participants provided honest responses.

### **Scope and Delimitations**

The Adventist educational system is the second largest private school system in the world with over 8,514 schools, 108,656 teachers and 1,954,920 students at the elementary, secondary, and higher education level (Adventist Education, 2018). In North America there are 799 schools and 9,805 teachers with a total of over 84,907 students (Adventist Education, 2018). For the purpose of the research study, all school principals working for the Adventist educational system in North America were invited to

participate in the study. An invitation was sent only to individuals listed as actively taking the role of principals. The geographical territory of the participants was limited to the United States, Guam, Canada, and Bermuda.

### **Limitations**

The primary limitation for this research study was based on the way participants responded to the standardized survey. As the researcher, I had to rely completely on their responses and expected that their reports would provide accurate information. If the participants provided inaccurate information for fear of protecting their image or status, some of the collected data could have provided inaccurate information and led to the wrong conclusions. Participants were informed of the confidentiality of their individual answers and encouraged to provide honest responses. A second limitation was that since the research study focused only on Adventist school principals in North America, and thus the results were generalized only to the Adventist educational system in North America.

### **Significance**

A study of the LoTi and the personality traits of Adventist school principals was important for three reasons. First, the study expanded on previous research studies on similar topics, such as Halder et al. (2017), who demonstrated that the personality traits of teachers influence the learning process when instruction was given using technologies. The study provided new knowledge that contributed to closing the literature gap that currently exists on the personality traits and the level of the implementation of

technology (Csikszentmihalyi & Wong, 2014). Second, the research study provided information that could be used for the creation and selection of appropriate professional development opportunities regarding current technology implementation practices. Third, research results affected positive social change by providing school districts with information about personality traits that could enable individuals in administrative positions to reflect on how personality traits, including their own, could influence technology implementation and, thus, use the information to improve the quality of the educational program and potentially their surrounding communities. Mayer (2017), stated that “personality is a means by which each of us navigate our lives”.

### **Summary**

This chapter offered an introduction to the research study providing an understanding of the need to learn if a relationship exists between the level of technology implementation and the personality traits of extraversion, conscientiousness, openness, agreeableness, and neuroticism of Adventist school principals. Limited knowledge on the topic can lead to inadequate professional development. The information provided in this chapter served the purpose of justifying and offering a foundation for the rest of the research study.

Chapter 2, the review of the literature, discusses the following topics: the historical background of technology implementation in the educational field, technology and school administration, the CBAM and Big Five Personality Traits theoretical frameworks, the current research in technology leadership and school administration.

Chapter 3 discusses the method of research used and offer a full description of the research tools incorporated in the study. Chapter 4 includes the statistical analysis providing tables and figures of the information gathered during the research study. Finally, Chapter 5 discusses and interprets the findings of the study and makes recommendations for future research studies.

## Chapter 2: Literature Review

Technology has impacted our way of life, particularly in the field of education. Educators and school administrators need to find ways to stay current with the latest technological trends and to understand how to better prepare their students for the future. According to Reynolds and Warfield (2010), school administrators are responsible for creating the appropriate environment where effective learning can take place. The leadership approach of school administrators can radically influence the learning environment of a school, particularly in the way technology is perceived and implemented (Bergland Holen, Hung, & Gourneau, 2016). The personality traits of a school administrator, along with the perception of technology, can impact the way technology is used and implemented and thus could influence student achievement (Csikszentmihalyi & Wong, 2014).

The following chapter provides a concise synopsis of the current literature on technology implementation and its relationship to personality traits of extraversion, openness, conscientiousness, neuroticism, and agreeableness. It also provides a research-based analysis of the theoretical foundation that drives the study and how it relates to the research questions.

### **Search Strategy**

The focus of the literature review was based on the purpose, problem statement, and variables of the research study. The literature included searches in three topics: technology implementation, school administration, and leadership. Keywords and terms

included *technology implementation, personality traits, school administration, Great Man Theory, Concerns-Based Adoption Model, Levels of Use of Innovation, Big Five Personality Trait, Trait Theory, digital divide, and leadership*. Out of the hundreds of articles retrieved, the selected peer-reviewed articles were chosen by their published date (2015–2018) and relevance to the topic. Several relevant articles referred to previous research studies. The studies were used to expand the knowledge of the analyzed topics, in particular those of primary sources.

The articles were found using five databases: EBSCO, ERIC, Education Source, ProQuest dissertations, Google Scholar. Research articles were organized by topics and relevance to the purpose of the research study. Walden University's librarians contributed to the search process by providing guidance for specific topics.

## **Literature Review**

### **Historical Overview of Technology Use for Instructional Purposes**

The topic of how technology is utilized for instructional purposes has always been on the forefront of educators across cultures and eras (Hammond, 2014; Parker & Davey, 2014). Tools, such as carvings on rocks or drawings on cave walls, have given proof of the need of incorporating instructional resources in the process of transmitting knowledge since the dawn of time (Hangen, 2015). With the arrival of new technological devices, educators continue to be forced to find various instructional approaches that can meet the learning needs of their students (Parker & Davey, 2014). It is also important to analyze where instructional tools have come from and where they might be heading into the

future as a way of understanding the importance of technology in relation to instruction and leadership in the school setting (Parker & Davey, 2014).

### **The Pre-Personal Computer Years**

During the XV and XVI century, wooden paddles called Hornbooks were created to help young students learn the alphabet and religious materials in Europe, which were brought to America during the Colonial times (Firmin & Genesi, 2013). Later, during the late 1800s, a new device called the magic lantern or *laterna magica* was invented where images were painted on pieces of glass and projected on a wall (Parker & Davey, 2014). This device originally became popular for entertainment purposes and later incorporated at the classroom setting for instructional purposes (Parker & Davey, 2014). It is believed that by the end of World War I a total of about 8,000 magic lanterns were in use in the Chicago Public School system (Parker & Davey, 2014). At the end of the 1800s the blackboard or chalkboard, as some people called them, were introduced in the school settings followed by the introduction of the pencil, something that revolutionized the way transfer of knowledge was given (McCorkle & Palmeri, 2016).

Throughout the course of the 1900s, a series of innovations drastically changed little by little the educational field. In the 1920s the radio brought a new and revolutionized the way of learning (Lim, Zhao, Tondeur, Chai, & Tsai, 2013). A series of narrated classes were shared through the radio waves reaching any student who owned a radio and was within radio wave range (Lim et al., 2013). Then, the overhead projector was introduced in 1930 before the ballpoint pen in 1940 (McCorkle & Palmeri, 2016).



The headphones came out in 1950 along with the videotapes in 1951 (Lim et al., 2013). Such technological developments brought much excitement within the educational field allowing teachers across the nation to implement new and innovative instructional approaches (Lim et al., 2013). During this time, the teaching machine was implemented in the classroom setting, even though the device itself was already invented by Sidney Pressey. In the early 1920s B. F. Skinner applied his theoretical ideas using positive reinforcement to teach students of all ages a variety of subjects (McCorkle & Palmeri, 2016). Some of the benefits of this device were that it provided appropriate automatic and positive reinforcement that was adjusted to the needs of each individual student (McCorkle & Palmeri, 2016). As a result, students demonstrated to be better motivated to learn proving this learning process to be effective (Lim et al., 2013).

In 1959 the photocopier was introduced in the school setting, ten years after Xerox Corporation introduced the first machine named Model A (Firmin & Genesi, 2013). With this invention, the reproduction of reading and writing materials once again proved to change the instructional approach given in the classroom (Firmin & Genesi, 2013). In 1972 the handheld calculator provided students with the ability to make complicated mathematical calculations easier to solve (Davies & West, 2014). Around this time the Scantron system was developed giving teachers the ability to efficiently grade tests for the purpose of providing immediate feedback (Lim et al., 2013).

The pre-personal computer years became very important and formative in the educational field regarding the future decision of the implementation of more advanced

technological tools in the classroom for instructional purposes (Davies & West, 2014). Devices such as calculators, video projectors, photocopy machines, and the Scantron had changed the way students learned (Davies & West, 2014). The process for the implementation of technological devices in the school setting is reflected on a U. S. Department of Education (2016) report that says that in 1900 only 10% of students enrolled in high school had access to any of them, but only to paper, pencil, and reading books. This drastically changed during the course of the XX century and by 1992 the high school enrollment had grown to 95% (U. S. Department of Education, 2016). In a similar way as high school, at the post-secondary level, in 1930 enrollment of college students nationwide was approximately 1 million increasing by 2012 to a total of 21.6 million (U. S. Department of Education, 2016). Students and teachers needed new ways to receive and provide knowledge. The communication channels had drastically changed, and the educational system needed to make the proper adjustments to meet the needs of the new generation.

### **The Personal Computer Years**

The first recorded personal computer was developed during the 1930s, but it was not until the early 1980s that the personal computer was first introduced (Davies & West, 2014). The average cost of such device at the time was \$1,795 (Davies & West, 2014). Time magazine named in 1982 the computer as the Man of the Year (Davies & West, 2014). This captured many people's attention and set the foundation for many new

developments that would very soon be implemented in the school system for educational purposes (Parker & Davey, 2014).

In 1984 a small company named Apple developed a portable computer device that would later be called Powerbook (Parker & Davey, 2014). A year later, Toshiba began the mass production of a laptop computer named T1100 for the purpose of hitting the home and business markets by quickly changing the way office and school settings operated (Lim et al., 2013). In 1990, a new way of communication was now made available to the public through the computer using a format known as Hyper Text Markup Language or HTML (Parker & Davey, 2014). By 1993, the National Science Foundation removed commercial restrictions in the use of the Internet creating an array of new possibilities for global communication and commerce (Davies & West, 2014). Later that year, Apple introduced its first Personal Digital Assistant device, or PDA, allowing individuals to digitally store information by bringing it with them wherever they went (Warnich & Gordon, 2015).

As a result of such technological innovations, the educational field was confronted with many decisions to implement computers, Internet use, and portable devices into the classroom setting (Hangen, 2015). Educators across the nation had to implement new instructional approaches that would prepare their students to meet the new communication and learning needs (Ronau, Rakes, & Niess, 2012). As a result, 2009 reports demonstrated that 97% of classrooms had one or more computers available and that 93% of them had reasonable Internet accessibility (U. S. Department of Education,

2016). At the college level, 83% of the students own a portable computer and at least 50% of them had a smartphone (U. S. Department of Education, 2016). By 2015, 98% of schools reported having computer accessibility in their classrooms (U. S. Department of Education, 2016). At the same time, 75% of the students reported using technology in one way or another for instructional purposes and the U. S. Department of Education spent \$12,605 per student in 2015, compared with \$9,138 in 2005 (U. S. Department of Education, 2016).

As technology continues to evolve, so should teachers across the educational field (Renwick, 2015). Being informed of the latest trends and having the ability to adapt to new ideas should be a requirement for every teacher (Hutchison, 2015). The following section of this research focuses specifically on the implementation of technology in the school setting and the importance leadership and personality traits have on the instructional and learning process.

### **Importance of Technology Implementation in the School Setting**

In the 21<sup>st</sup> century, the use of technology in the educational setting should be considered an essential component at all levels. Technology is an integral part of our lives, which, according to Dawson (2012), can provide benefits that exceed the academics. It can be said that the need for everyone to be technologically literate is something that all educators and school administrators always need to keep on the forefront (Ertmer, et al., 2012).

In today's workforce, employers primarily hire individuals who possess the necessary technological skills rather spending time and money to train unqualified candidates (Bevins, Carter, Jones, & Moye, 2012). Education provides the necessary skills young people need to meet the challenges of a rapidly changing world (Bacon, 2013). Educational settings have tried to continuously adapt by mirroring the technological trends that have influenced the outside world (Bacon, 2013). Some of the challenges that schools still face are that many educators refuse to adapt to the societal changes and continue to provide the same instructional approach as a century ago and expect to achieve similar academic results. (Ertmer, Ottenbreit-Leftwich, & Tondeur, 2014; Kuyatt, Holland, & Jones, 2015). In their defense, Perrota's (2013) research study strongly recommended individuals not criticize educators because they have chosen to continue using traditional teaching approaches.

Even though critics point out that very little has changed in the educational arena, almost a decade ago Adcock's (2008) research demonstrated the opposite by stating that as a result of the integration of technology in the classroom, the roles of teachers and students are different from thirty years ago. In classroom settings where technology is properly utilized, teachers become facilitators of instruction rather than mere reflectors of knowledge (Ertmer et al., 2012). Students are at the center of the learning process and instructional strategies such as individualized instruction or cooperative learning are utilized daily (Ruggiero & Mong, 2015).

Technology, in the same way as any instructional resource, can become extremely valuable when appropriately used (Stobaugh & Tassel, 2011). Teachers should be encouraged to use it not only to convey information in the same way textbooks do but to assist their students in the process of developing higher level and critical thinking skills (Ruggiero & Mong, 2015). Technology by itself does not necessarily bring student success, but the skillful abilities that teachers have in their classrooms, as well as their instructional practices that meet the needs of their students (Daniels, Jacobsen, Varnhagen, & Friesen, 2014). Ruggiero and Mong (2015) suggested this would be accomplished when school administrators and teachers continually maintain and update a balance between the pedagogy, the intended content, and current technology. Some people believe introducing technological devices in the classroom setting inevitably guarantees positive learning outcomes, which contradicts what in reality takes place (Daniels et al., 2014).

Successful implementation of technology in the classroom includes attitude parents and their children have towards learning, the teaching style of the teachers, and the knowledge they have towards the acquired technology (Ertmer et al., 2014; Pritchett, 2013; Vatanartiran & Karadeniz, 2015). Kapila and Iskander (2014) found that those students who also receive the opportunity to interact with technology through hands-on educational activities were proven to have higher level thinking skills by mastering their content. Davidson, Richardson, and Jones (2014) concurred, stating that by correctly implementing technology into their teaching in a way that supports social interaction in a

collaboratively way, teachers intentionally prepare their students for the real world. School administrators and teachers are constantly looking for ways to eliminate any obstacles for students to learn and become successful (Kuyatt et al., 2015), and incorporating technology into instruction might be a way to guarantee student academic success.

It is also important to consider the technological knowledge students and teachers have and the knowledge gap that exists between them (Ronau et al., 2012). Researchers recommended that school districts provide adequate professional development with an emphasis on hands-on training that would meet the needs of the learning community they serve (Khobidi, Chikasanda, Otrel-cass, Williams, & Jones, 2013; Koehler et al., 2013). Once teachers receive the proper training, they should be able to model appropriate technological use (Ertmer et al., 2012), allowing students to become better acquainted with the manner on how technologies work in the real-world workplace and the responsibility that comes along with its use (Ertmer et al., 2012).

One of the most important reasons teachers feel compelled to implement technology in their classrooms is because they believe that such technologies have the potential of improving their student's academic engagement and motivation (Carver, 2016). Because of this, school administrators should evaluate ways to analyze the effectiveness of the acquired technologies from the standpoint as to how students benefit from the acquisition of knowledge, differentiate instruction for all students, and motivate students academically (Garcia, 2013).

Even though there still seems to be some difference in the accessibility of technology today, the majority of students can access the Internet from their homes or through public places using multiple technological devices (Pearson, 2013; Madden, 2103). Consequently, students' access to information is directly affecting the process they use to distinguish the quality of the acquired information (Delgado, Wardlow, O'Malley, & McKnight, 2015). However, what is important is not just simply having access to the internet but utilizing the Internet inside and outside the classroom to acquire information (Kemp, et at., 2014).

Technologies, such as virtualization technologies, are helping schools simplify the process for keeping up with their infrastructure by combining a vast number of hardware and software components providing at the same time the necessary elements for instruction and proper school administration to take place (Klement, 2017). As time goes by, it is expected that more options will become available and affordable providing solutions to many of the challenges educators and school administrators currently face (Klement, 2017). Another technology that is affecting student learning is the social media. A research by Mao (2014) suggested that students, particularly at the high school level, need to be given specific parameters and framework when using social media as a means for learning purposes. The recommendations come from the fact that young people in particular use social media for entertainment or social purposes (Mao, 2014).

Studying the way technology affects how students learn in the classroom setting is gaining more interest from the research field and with it the debate whether or not



technology has a positive impact on student achievement (Gilchrist, Carpenter, Bowles, & Gray-Battle, 2012). Current research has revealed that technology is being utilized in the classroom across various levels and is providing the opportunity for students to learn the necessary basic skills needed in the 21<sup>st</sup> century (Delgado et al., 2015; Ertmer et al., 2014). At the same time, it allows students to be able to acquire and apply these newly learned concepts both inside and outside the walls of a traditional classroom (Delgado et al., 2015). One example is demonstrated in a research study by Varank and Ilhan (2013) where he analyzed the relationship teachers have with skills of educational technology and their classroom management. The results demonstrated that tenure teachers with high perception of technological skills also have a higher level of classroom management skills (Varank & Ilhan., 2013).

Teachers should analyze and understand the many different ways technological devices can be integrated into the various subjects (Howard, Chan, & Caputi, 2015). By doing so, they will find creative means to incorporate technologies into their teaching thus providing students with the opportunity to achieve specific academic outcomes (Howard et al., 2015). At the secondary level, academic outcomes are directly guided by the curriculum and the subjects being taught (Hursh, 2013). For teachers to support the integration of technology in their field, it would be beneficial if they value the idea that the technology will support the academic standards and learning outcomes (Howard et al., 2015). For a successful implementation of technology at the classroom setting and for it to be fully accepted, teachers should become involved in the implementation process by

creating an active learning environment that will allow the technology to become an essential learning tool (Ertmer et al., 2012). Such teachers have the ability to utilize various technologies in their classrooms by applying proper pedagogical strategies that meet each of their student's academic needs, making the technologies valuable in any school setting (Ruggiero & Mong, 2015). To reinforce what is aforementioned, Webb and Jurica (2013) stated that every educator must engage students through effective learning experiences using technologies ensuring that contemporary pedagogical teaching strategies are being utilized. It is not about adding more technologies into the classroom setting, but how the chosen technologies are applied to engage students in the learning process (Webb & Jurica, 2013).

### **The Digital Divide and the Implementation of Technology**

Even though educational researchers have provided ample amount of research on the topic of digital divide, a limited amount was found from within the last five years. However, as a way of better understanding the current research study, the topic of digital divide is included in this literature review with the intent of providing valuable information to expand the knowledge of how technology is impacting education and society taking into consideration that the concept of digital divide is continuously evolving as new technologies are implemented and embraced to accomplish daily tasks.

Even though differences in the accessibility of technology still exist today, most students in the United States have the opportunity to access the Internet at home and school (Pearson, 2013; Madden, 2013). However, the term "digital divide" was

introduced in the 1999 National Telecommunications and Information Administration report which explained that such term referred to the difference in access to technology between those individuals who had access and those who did not (U. S. Department of Commerce, 1999). Since the late 1990s, considerably more global attention has been given to the discussion on what impact technology has had on education (Waycott, Bennett, Kennedy, Dalgarno, & Gray, 2010).

When the term digital divide was first introduced, researchers focused their studies mainly on the accessibility of technology and its use by various groups of people (Warschauer & Matuchniak, 2010). At that time, the findings were focused on the idea that technology could be utilized to solve any major societal problems (Pearce & Rice, 2013). This change comes as a result of an attempt to understand the nature of the problem found among these different social groups (Eastin, Cicchirillo, & Mabry, 2015; Mesch, 2012).

Current research demonstrates that two types of digital divide exist. One that shows the differences in the accessibility of technology, and the other the difference in the way technology is utilized (Rainie & D’Vera, 2014). The barrier regarding the accessibility of technology has in some way been dealt with at the federal level through the creation of policies producing positive results in its attempt of closing the gap (Mossberger, Tolber, & Hamilton, 2012). These results have differed from the utilization divide due to factors such as the ability and skills of individuals in the use of technology,

intrinsic and extrinsic motivation in the use of technology, and the way it always changes (Ferro, Helbig, & Gil-Garcia, 2011).

Currently, technologies rely mainly on the Internet and not so much on actual devices shifting the conceptual idea of digital divide (Zhao, Lu, Huang, & Wang, 2010). The digital divide term aims at the notion of digital inequality, which focuses on the impact that the Internet has on the various technological devices (DiMaggio, Hargittai, Celeste, & Shafer, 2004). Under this concept, digital inequality is measured by a set of four dimensions that directly affect student outcomes and academic achievements. Such dimensions are autonomy of use, social support, technical apparatus, and technology use (Zhao et al., 2010).

The basis from which research has measured computer accessibility and use within a particular group of individuals has made it very difficult to define the term digital divide (Mesch, 2012). Earlier studies determined their analysis on digital accessibility by analyzing computer-to-student ratio in many schools and educational systems (Pearce & Rice, 2013). Future research studies on digital accessibility allowed the researchers to use the initially acquired information and identify the median for each community (Pearce & Rice, 2013) providing valuable information that expanded the knowledge in the areas of gender, race, socioeconomic status, and geographic location (Jones, Johnson-Yale, Millermaier, & Perez, 2009; Mesch, 2012; Pearce & Rice, 2013).

In regard to gender, research shows that the difference in computer use and accessibility of technology has lessened, even though on average girls had fewer devices

and less access to the internet than boys (Ferro et al., 2011). When research focused on student attitude towards technology, the results demonstrated that boys are more inclined to use technology for entertainment and girls use it to communicate with their peers or adults (Cooper, 2015; Huang, Hood, & Yoo, 2013). A research study by Jackson et al., (2008) also revealed that girls tend to be more creative and prefer non-competitive applications that focused on collaboration.

Researchers have found that concerning race, Hispanic, African-American, and Native American races tend to have less accessibility to a computer and the Internet than Anglo and Asian individuals (Anderson, 2015). Findings also indicated that the level of sophistication for which the technology is utilized significantly differs between the races mentioned above (Anderson, 2015). A study by Kiesler (2014) demonstrated that students with an Anglo background were more inclined to develop websites and produce presentations, while minority students were more likely to use the technology for entertainment and simple drill and practice assignments. It is possible that the difference in the use of technology between the racial groups can be a result of many factors, such as a lack of interest in the academic technological use, discrimination, or minimal exposure to appropriate technological resources (Chapman, Masters, & Pedulla, 2010).

For the purpose of identifying the socioeconomic status divide, it is important to define under which terms students are considered living under the poverty level. Researchers used state guidelines that described which students were found to be economically disadvantaged by identifying students who qualified for free or reduced

lunch program at their schools (Eastin et al., 2015). The collected data demonstrated that a minimal to almost no difference exists in computer use in a school setting based on socioeconomic background (Eastin et al., 2015). The results significantly changed when computer use at home was analyzed from the same group of students (Eastin et al., 2015). Ching, Basham and Jang (2005) attributed the gap on the accessibility of technology in the home to the family's base income level, even though the federal government has and is attempting to close this technological gap through programs such as Title I or e-Rate (Trotter, 2007).

Geographic location has also played a significant role in the accessibility and use of technology. The major concentration of people with updated technology lives in urban areas in contrast to individuals who live outside urban areas (Ferro et al., 2011). This appears to be affecting the academic achievement of students by limiting the available resources and potential learning aids that could be used by the students at home (Ferro et al., 2011). Even though in general terms students who live in rural areas have limited access to computers compared to those in urban areas, successful community efforts have allowed schools to acquire technology and improved Internet accessibility during the last decade contributing to a reduced technological gap (Pearce & Rice, 2013). Still, more effort needs to be made to help communities where minority students live regardless of whether they are in urban or rural areas (Pearce & Rice, 2013). Accomplishing the task of closing the technological gap could come from individuals in leadership positions at the

school and government, thus it would be helpful to examine the topic of leadership and school administration, as well as implementation of technology or innovations.

### **Concerns-Based Adoption Model and LoTi**

The CBAM was originally developed to assist school administrators and school districts by providing a conceptual framework to identify authentic uses of technology in the classroom setting (Moersch, 1995). In order to understand the LoTi, the Concerns-Based Model (CBAM) provide an understanding of the level of use of technology and the technology implementation process. The CBAM is a research-based model that describes the personal development and stages individuals go through during the innovation process (Hord, Rutherford, Huling, & Hall, 2006). The model is also established on the understanding that the process of change comes from personal experience that is developed over time involving the development of specific skills and feelings toward the innovation (Hall & Hord, 2006). As innovations are implemented and defined, predictable and measurable implementation stages can be observed (Hall & Hord, 2006). The model uses specific types of questions that people ask to demonstrate the transitional process. The questions asked range from self-oriented, task oriented, finally evolving to be impact-related (Gundy & Berger, 2016).

The model identified seven stages of concern that describe the levels of technology innovation. The awareness stage is expressed by an attitude of lack of concern. The informational stage denotes an expression of interest of learning more about the innovation. The personal stage expresses a level of concern regarding how the use of

the innovation will personally affect the individual. The management stage of concern is denoted by showing efforts to handle the change. The consequence stage can be identified by the individual asking how the use is affecting the learners. The collaboration stage is expressed by the individual asking questions about how to collaborate with others using the innovation. The final stage, refocusing, denotes that the innovative ideas are fully developed regarding the innovation (Gundy & Berger, 2016).

CBAM asserts that innovations take time to become fully established and that changes can only take place when members of the organization change (Min, Lee, & Yoon, 2017). According to the model, change is personal and the perception of each individual regarding the change process will determine the outcome (Min et al., 2017). CBAM also indicates that using client-centered diagnostic models the innovation process can be facilitated or enhanced (Min et al., 2017).

As part of the CBAM, the Levels of Use of Innovation is an eight-step behavioral indicator of the innovation process based on the seven stages of concern. At the non-use level, individuals demonstrate no interest and use of the innovation. At the awareness level, individuals take the initiative to acquire information about the innovation. At the exploration level, individuals make specific plans to start using the innovation. At the infusion level, changes and preparations are being made in order to use the innovation. At the integration: mechanical level, a pattern of use is established. At the integration: routine level, changes are being made by the user towards improved outcomes. At the expansion level, deliberate efforts are being made by the individual to collaborate with



other people using the innovation. At the refinement level, individuals look for alternative ways to use the innovation to improve the outcomes (Knezek & Christensen, 2016).

The LoTi Digital Age Survey used for the study was developed by Moersch in 1995 from the CBAM with the purpose of measuring the levels of technology implementation at schools (LoTi Connection, 2010). Moersch used the eight levels in the Levels of Use of Innovation, a component of the CBAM, and developed the LoTi Digital Age Survey to gather data that would provide any researcher with an accurate assessment of the LoTi of the participants (Hall et al., 2013). Utilizing the CBAM's Levels of Use of Innovation provided a theoretical foundation for understanding the level and implementation process of technologies in the educational setting. The survey has evolved since its inception to align to the National Educational Technology Standards (NETS) (LoTi connection, 2010). The original terms used were non-use, orientation, preparation, mechanical use, routine use, refinement, integration, and renewal, which were replaced in 2009 with the terms of non-use, awareness, exploration, infusion, integration: mechanical, integration routine, expansion, and refinement (LoTiGuy, 2009). Even though the Levels of Use of Innovation have not changed, the terms used in the LoTi Digital Age Survey for Leaders at the present time were changed in 2009 to meet the new NETS (LoTiGuy, 2009). However, for the purpose of the intended research study, the focus of the research is the LoTis of Adventist school principals in relation to personality traits, as they could hold the key to future implementations at the school level (Barczyk & Duncan, 2017).

## **Leadership and School Administration**

A vast amount of research studies is available on the influence individuals in leadership positions have over organizations (Bryman, 2013; DuFour & Mattos, 2013; Fullan, 2013; Hargreaves & Fullan, 2013; Spillane & Kenney, 2012; Shahrill, 2014). Such research studies concur that for an organization to succeed, it must have an effective leader (Fibuch, 2011). This section of the research study will focus on the term leadership and the necessary elements needed within an organization. The analysis will provide a foundation for the research study.

Before proceeding with the analysis, it is appropriate to define the word leadership. Even though many researchers have tried to unify their ideas on its definition, their attempts have not been successful due to many different points of view and circumstances that relate to the term (Chen, Eberly, Chiang, Farh, & Cheng, 2014). However, researchers do agree that leadership requires two parties, one that leads and one that follows (DuFour & Mattos, 2013). This concept focuses on the idea that leadership involves a group of individuals who are being influenced in one way or another. Along the same idea, it also means that a particular group of people is jointly pursuing a common purposeful goal. (Northouse, 2015). In other words, leadership is a process where an individual influences a group for the purpose of attaining a common goal (Northouse, 2015).

Kolluru (2012) proposed that effective leadership occurs when a leader empowers and equips others by providing the appropriate vision, planning, and change that an

organization needs to succeed. The lack of such elements most likely will result in the failure of the organization as a whole (Kolluru, 2012). For that reason, the essence of leadership is based on its functionality (Tourish, 2014). In other words, it is the role of the administrator to establish the organizational goals while identifying each member's needs and their abilities for the purpose of ensuring completion of the set organizational goals (Kolluru, 2012).

Our society is constantly changing, and as a result, for the organization to be successful, all its members need to find various ways to adapt themselves to meet external challenges (Kolluru, 2012). Leaders are expected to analyze the external environmental elements that might influence the internal decisions by aligning specific strategic organizational goals and conveying them to the rest of the members (Kolluru, 2012). In a similar way, in educational settings, school administrators have the responsibility to take the same approach and demonstrate competence in daily decisions by their ability to influence those individuals under the realm of their responsibility (Hargreaves & Fullan, 2013). Their leadership skills will ultimately have a direct impact on the well-being of the organization and the academic success of their students (Hargreaves & Fullan, 2013). The role of school administrators can sometimes become confusing. (Aldunate & Nussbaum, 2013). A school administrator may be considered an educator whose primary interest is the academic well-being of the students and the learning process that takes place daily in the classroom setting (Ertmer et al., 2012). On the other hand, the role of the administrator may be interpreted as one who is responsible

managing the resources and making the appropriate decisions that would best benefit the needs of the school and the communities they serve (Ertmer et al., 2012). With these two thoughts in mind, it can be said that a successful school administrator can balance both roles without neglecting either of them.

School administrators who provide the opportunity for their staff to have open communication are more likely to positively motivate each to be successful by encouraging intellectual interest in acquiring new knowledge and, as a result, improving the school's working environment and student academic performance (Harris et al., 2013). School leaders must also identify the needs and wants of their staff and not be afraid to make decisions that would benefit the whole educational institution (Spillane & Kenney, 2012). They need to be passionate about they do, nurturing new ideas and creating collaborative working environments (Harris et al., 2013). Successful school leaders inspire their staff members by creating an environment of trust and unity (Braun, Peus, Frey, & Knipfer, 2016).

One of the challenges for school district administrators is defining the effectiveness of their local school administrators. Freeman (2011) proposed that influence measures the effectiveness of a successful leader he or she has on other individuals and the organization as a whole. There are two ways to measure their influence. One way is by evaluating the accomplishment of goals set by the organization; and the other is how individuals from within the organization perceive and assess the leader's ability to function within the organization (Shahrill, 2014).

Matching the personality trait of a leader with the appropriate leadership style can be greatly beneficial and contribute to the administrative success of the leader (DuFour & Mattos, 2013). Many organizations, such as the military, have implemented questionnaires to identify specific personality traits for the purpose of developing directions to aid in fulfilling their responsibilities (Fleeson & Jayawickreme, 2015). At the school setting, school administrators hold the key to the success of their schools and consequently should be selective who they hire for these positions (DuFour & Mattos, 2013). At the same time, school districts must continually assess individual's effectiveness to ensure that everyone, including teachers, students, and local communities receive what they need (Lumby, 2013).

### **Evolution of the Personality Traits Theories**

Since the purpose of the current research study is to provide an insight on the relationship between the personality traits of secondary Adventist school principals and the LoTi, it is important to analyze leadership theories that could provide a broader understanding of the administrative role and personality traits, particularly of those at the secondary level. Most leadership theories derive from the Great Man and Trait Theories of leadership (Amanchukwu, Stanley, & Ololube, 2015; Penney, Kelloway, & O'Keefe, 2015; Ryckman, 2012; Schultz & Schultz, 2016). Such theories had the intent of describing the characteristics and specific behaviors of individuals in leadership positions who were successful in their field. As theories evolved, so did the emphasis researchers

put on their studies focusing on the role followers have, ultimately understanding leadership from a contextual perspective (Spector, 2016).

**Great Man theory.** Nineteenth-century Scottish historian Thomas Carlyle proposed the idea that leaders have an innate skill to manage and modify the various social structures for the purpose of bringing social change (Penney et al., 2015; Spector, 2016). He proposed a rational explanation that could explain how various individuals accomplished what they did in their lifetime (Heller, 2016; Spector, 2016). The main idea of the Great Man Theory is that leaders are predestined since birth (Malos, 2012). This theory also proposed that individuals who imitated the behavior of great leaders could also accomplish similar results (Heller, 2016). Such an idea came as a consequence of the popular belief that leaders were born not made (Matthews, 2015). People believed that providence was a credible factor for explaining the social and political events throughout history, something that was also reinforced by the discussion of nature versus nurture and the idea that a few individuals in leadership position led the masses (Bass, 1999).

It can be inferred that the Great Man Theory of leadership proposes that leadership itself is a direct gift from God, implying that individuals with this gift may be considered to be acting under a divine influence (Heller, 2016; Spector, 2016). This limits the ability for other individuals who were not given the opportunity to lead to even try (Spector, 2016). The theory also reinforces the notion of status quo, which emphasizes the idea that everyone has a specific role in society that must be complied (Heller, 2016). In other words, this theory proposes the simple idea that someone who is born with the

necessary leadership skills is already empowered to have influence over a group of followers and instinctively destined to succeed (Heller, 2016). Elements, such as the needs of the followers or the socioeconomic situation, have minimal influence on the effectiveness of the leader (Spector, 2016). Lastly, the qualities of leadership cannot be passed on through any special training or educational course (Matthews, 2015).

Something that should be acknowledged about the theory is the idea that leaders are generally admired by their followers (Heller, 2016; Spector, 2016). Their decisions and actions inspire respect even though not they might not have the complete support of all of their followers (Heller, 2016; Spector, 2016). The fact that some historical figures became powerful, changing the course of history without any specific formal training, could denote and support the idea of some form of innate genetic leadership trait (Matthews, 2015).

The limitations of the Great Man Theory became very inconsistent with the results collected by future studies. Researchers like Bowden, as mentioned in Spector (2016), realized that many influential leaders utilized a wide variety of personality traits that were very difficult to imitate and follow. The research field focused their efforts on the relationship between behavior and leadership traits (Heller, 2016).

Researchers have come to the conclusion that the Great Man Theory does not possess any scientific basis or provide any empirical validity to what it proposes (Matthews, 2015). It is considered more of a speculation than actual facts, making it difficult for anyone to believe that any individual can become a great leader without the

influence of the surrounding environment and circumstances (Matthews, 2015).

However, even though the Great Man Theory failed to provide what social leaders were looking for, it created the opportunity for other researchers to focus their attention on areas such as psychology, behavior, and personality, which in return would develop into new theories (Bass, 1999). Currently, researchers no longer believe that leaders are born with innate qualities but have argued that the characteristics of a leader were utterly different from those of their followers (Amanchukwu et al., 2015; Matthews, 2015; Spector, 2016;).

**Trait theory.** The development of the Trait Theories came as a result of the Great Man Theory for the purpose of identifying the main characteristic of successful leaders (Fleeson & Jayawickreme, 2015; Mroczek & Little, 2014; Ryckman, 2012; Schultz & Schultz, 2016). This approach was believed to be instrumental in the selection and recruitment of individuals for particular leadership positions, especially in the military where the candidates were expected to have a certain set of personality traits (Higgs & Dulewicz, 2016; Ewen, 2014; Ryckman, 2012).

On the other hand, Allport (1937) tried to bridge the gap between the leadership trait theory and the philosophical ideas proposed by the Great Man Theory (Ewen, 2014; Mroczek & Little, 2014). The intent was to create a list of descriptive words that could explain behavior and personality traits to be used by the scholars to analyze an individual's behavior and inherent characteristics (Allport, 1937; Ewen, 2014; Mroczek & Little, 2014). A list of 17,953 words was created and divided into four different



categories: words that described personal behavior or that described different influences on people in one way or another, words that described traits for an individual's ability to adapt to the surrounding environment, words that described emotions and how an individual felt, and finally, words that described a person's physical qualities and aptitudes (Allport, 1937; Ewen, 2014; Mroczek & Little, 2014). The list of words was later reduced to a total of 4,500 and re-categorized into five new categories known as the Big Five personality traits model (Allport, 1937; Ewen, 2014; Fleeson & Jayawickreme, 2015; Schultz & Schultz, 2016).

Since the inception of the Trait Theory, researchers such as Stogdill (1948), Mann (1959), and Kirkpatrick and Locke (1991) have continued analyzing and developing the theory. Stogdill, as mentioned in Bass (1999), conducted two research studies on the topic. The primary focus of the first study was to analyze and synthesize 25 previous studies for the purpose of identifying how individuals from various groups develop their leadership skills (Stogdill, 1974). The study demonstrated that leaders are dependable, active participants, persistent, social, knowledgeable, take initiative, confident, cooperate, adaptable, popular, and know how to communicate with other people, in comparison with other members of the same group (Stogdill, 1974). On his second study, Stogdill (1974) expanded his area of research and this time focused on 163 studies that dated from 1948 until 1970. The results demonstrated that a significant difference exists between the traits individuals in leadership positions have than individuals in any other groups (Bass, 1999).

Even though the Trait Theory gained significant interest from the research field before the 1940s, many individuals began to question its validity after several research studies demonstrated that leaders have different sets of traits that are needed under different circumstances (Colbert, Judge, Choi, & Wang, 2012; Fleeson & Jayawickreme, 2015; Madden, 2013; Stogdill, 1948). At the same time, many researchers argued that the Trait Theory was not taking into consideration the relationship between those in leadership positions and those as followers (Bass, 1999; Colbert et al., 2012; Mroczek & Little, 2014). Another limitation of the Trait Theory was found between the integration of traits in studies of personality and gender (Stogdill, 1948). The reaction from researchers changed the way this theory was perceived and left many of them wondering how this theory could be applied when independent variables were analyzed (Ryckman, 2012). For some, the Trait Theory alone demonstrated not to be accurate and needed to be analyzed and understood from a different perspective leading into the development of new personality theories, such as the Big Five Personality Traits theory (Bass, 1999; Ewen, 2014; Funder, 2015).

**Big Five Personality Trait model.** Research studies during the 1930s and 1940s on the topic of personality traits led researchers to categorize a set of descriptive words for the purpose of identifying traits that would make individuals great leaders (Allen, 2015; Ewen, 2014; Mroczek & Little, 2014; Ryckman, 2012). But it was not until the 1980s that the current Big Five Personality Trait model was developed (Allen, 2015; Ewen, 2014; Mroczek & Little, 2014). Later, during the early 1990s and

after several empirical studies, researchers and physiologists came to a consensus regarding specific domains of personality (Allen, 2015; Thalmayer, Saucier, & Eigenhuis, 2011). Such areas of personality are neuroticism, extraversion, openness to experience, conscientiousness, and agreeableness (Allen, 2015; Ewen, 2014; Funder, 2015; Mroczek & Little, 2014; Ryckman, 2012).

Since its inception, many researchers have concluded that such theory provides a broad and comprehensive understanding of each individual's personality that can be utilized across many cultural settings. Even though the instruments for collecting data were originally developed in English, in recent years the same instrument was translated into various languages providing similar results. This was demonstrated by McCrae and Terracciano (2005) who utilized the assessment instrument with individuals in 51 different countries. Even though research supports this idea, researchers still believe that the assessment instrument needs to be continuously refined (Allen, 2015).

The Big Five personality domain neuroticism refers to the ability a person has to demonstrate emotional stability and deal with feelings of anger, depression, and anxiety (Allen, 2015). Those individuals with high levels of neuroticism tend to be sensitive and easily react to everyday stressful situations (Chamorro-Premuzic & Furnham, 2014). Under such conditions, these individuals tend to feel hopeless under normal circumstances (Chamorro-Premuzic & Furnham, 2014). It is normal for every individual to experience a form of neurosis; nevertheless, individuals who go through this process

for a prolonged period of time and suffer mental and emotional pain tend to struggle to think clearly, to make the right decision, and to deal with stress (Allen, 2015).

Extraversion personality domain is characterized by individuals who tend to denote positive emotions. They like to engage with other individuals and, in general, tend to get enthusiastic about taking on new opportunities (Allen, 2015; Ryckman, 2012). When in groups these individuals want to be part of the discussion, be assertive, and feel affirmed (Funder, 2015). Individuals who are introverts tend to keep to themselves, are less excited about opportunities, and need much less stimulation (Anderson & Sun, 2015).

Openness to experience refers to individuals who have the intellectual curiosity to work with abstract concepts in the professions of music, art, or production (Allen, 2015; Ryckman, 2012). In general, those individuals who work in higher education tend to score higher in that area (Chamorro-Premuzic & Furnham, 2014). Individuals who dislike change but prefer familiarity tend to have a closed style of thinking (Anderson & Sun, 2015). For such individuals, research demonstrates that they perform well in the areas of sales, law enforcement and general service (Miller & Maples, 2011).

Conscientiousness deals with the ability individuals have to control themselves (Allen, 2015; Ryckman, 2012). Such individuals tend to be more organized, show self-efficacy, are achievers, and are careful and dutiful (Haslam et al., 2015). Research has shown that individuals with low levels of conscientiousness are less social with a

potential of harming others (Anderson & Sun, 2015). Conscientiousness is a vital leadership trait, especially in any organization with pre-established goals (Funder, 2015).

Agreeableness focuses on the ability individuals have in working in collaboration with others and looking for ways to find social harmony (Allen, 2015; Ryckman, 2012). People who display these traits tend to be friendly, considerate, generous, honest and trustworthy (Chamorro-Premuzic & Furnham, 2014). In general terms, they carry a more positive attitude towards life and tend to be honest and decent individuals (Chamorro-Premuzic & Furnham, 2014). On the contrary, people who do not have these traits do not care much about others, care only about themselves, tend to have fewer friends, and are suspicious and uncooperative (Haslam et al., 2015). People who have this trait also possess an objectivity mindset that makes them great critics, scientists, and military personnel (Bono, Hooper, & Yoon, 2012; Gaughan, Miller, & Lynam, 2012;).

Even though the Big Five personality trait model fits all individuals, especially those in leadership positions (Mroczek & Little, 2014), for the purpose of the current research study, the Big Five Personality Traits Model is analyzed from the perspective of a school administrator. The idea is to better understand what recent research says about this topic that can provide a foundation for the intended research. At the same time, it is important to understand what recent research studies have found on personality traits in the educational field as they will provide a foundation for future research studies.

### **School Administration and the Big Five Personality Traits**

School administrators have an important role in the success of any school setting. Even though teachers are responsible for what takes place in the classroom and the instruction given on a daily basis, effective principals provide the necessary elements that create a positive school climate for learning to take place (Bono et al., 2012). Researchers have found that a relationship exists between the Big Five Personality Trait theory and the effectiveness of the school administrator (Ashton, Lee, de Vries, Hendrickse, & Born, 2012; Xu, Yu, & Shi, 2011). A set of personality trait assessments has been created that can provide valuable information in the process of predicting administrative success in the school setting (Bono et al., 2012).

Some research studies have analyzed the behavior of school administrators who displayed effective administrative skills (Marzano & Waters, 2009; Bruggencate, Luyten, Scheerens, & Slegers, 2012; Byrne, Silasi-Mansat, & Worthy, 2015). However, very limited research is available in regards to the individual personality traits effective school administrators have in comparison with those who display to be ineffective (Hochbein & Cunningham, 2013). An even limited amount of those studies analyzed the effect of school administrator personality traits and effective implementation of technology at the secondary level.

**Extraversion trait and school administrators.** Extraversion Trait focuses in general terms on the way individuals deal with social interaction (Judge, Higgins, Thoresen, & Barrick, 1999). Individuals who tend to score higher on the Extraversion

Trait are looked upon as outgoing, like to be around other people, friendly, and are open minded (Judge, et al., 1999). When given the opportunity to interact in social gatherings, they are the ones who normally are leading the conversation by taking on a leadership role (Threeton, Walter, & Evanski, 2013). Within organizations, they tend to bring positive relationships among colleagues by bonding emotionally with them (Derue et al., 2011).

Several studies have analyzed the relationship between the effectiveness of leadership and Extraversion Trait, providing similar conclusions (Judge, et al., 1999; Ashton et al., 2012; Xu et al., 2011). For example, Judge et al., (1999) examined 73 previous studies that utilized the Big Five personality traits in relation to leadership. Out of all the studies, the Extraversion Trait was found to show the strongest relationship in regard to leadership ( $p = .31$ ). The analysis of studies performed in different countries and cultural backgrounds also demonstrated similar results providing evidence that extraversion has a stronger relationship with emergence leadership ( $p = .33$ ) than the effectiveness of a leader ( $p = .24$ ). In a similar study, Xu, et al. (2011) focused his analysis on leadership traits and its relation to ethical leadership. The results of his study demonstrated that a strong relationship also exists between the Extraversion Trait and ethical leadership, as well as providing valuable information by extending the study using individuals from a different cultural background. Bartone, Eid, Johnsen, Laberg, & Snook (2009) analyzed army cadets in relationship of leadership performance during summer field training and academic instruction over a period of four years at West Point. Results

of the study demonstrated that during the academic period, the relationship between extraversion and leadership greatly diminished ( $r = .10$ ). In terms of the time period of field operations, the relationship positively changed, increasing the relationship of Extraversion Trait and leadership to  $r = .18$  (Bartone et al., 2009). It was concluded that during the period of time when the cadets received the academic instruction their focus was on their individual success. On the contrary, however, during field operations social interactions were required influencing their roles (Bartone et al., 2009).

In the educational field, Tatlah, Nizami, & Siddiqui (2012) conducted a study on school administrators finding that a close relationship exists between the leadership style of administrators and the Extraversion Trait. The results of such study also demonstrated that only a moderate relationship exists between individuals who are task-oriented ( $\beta = .17$ ) in comparison with individuals in administrative positions who tend to be people-oriented ( $\beta = .46$ ). Judge et al. (1999) explained that such behavior can be attributed to the fact that individuals who are extroverts tend to relate well with other individuals providing a goal-oriented approach to their leadership role, in this case, at the school setting.

**Conscientiousness trait and school administrator.** The Conscientiousness Trait mainly focuses on the ability any individual has to be organized, accomplish specific tasks and the consistency of working towards the assigned tasks (Judge et al., 1999). For those individuals in administrative positions, this trait translates to the ability to identify organizational objectives and finding effective ways to accomplish them (Schneider,



2007). All individuals possess this trait, however, some have it more developed than others (Schneider, 2007).

Bartone et al. (2009), as mentioned earlier, analyzed cadets from the West Point Military Academy using the Big Five personality traits to see if any relationship existed with leadership roles and conscientiousness traits. In this particular study, a relationship was found of  $r = .15$  from the standpoint of academic training and field operations, suggesting that conscientiousness traits play a major role in leadership regardless of the context (Bartone et al., 2009). In a similar study, Ellyson, Gibson, Nichols, and Doerr (2012) expanded the research and analyzed 860 individuals who were listed as “active duty,” regardless if they were already in leadership positions or not. According to the study, a result of .441 standard coefficient beta was gathered demonstrating that a strong relationship exists between military personnel in various contexts when it comes to the leadership and the conscientiousness trait (Ellyson et al., 2012). One of the challenges presented by these two studies was to corroborate if the results stayed true under different cultural contextual backgrounds. In some way, Xu, et al. (2011) accomplished that by analyzing a group of Chinese individuals who worked in the medical field in various cities across China. The results of such study confirmed that a significant relationship exists between conscientiousness ( $\beta = .39$ ) concerning ethical leadership (Xu, et al., 2011) providing similar results in the Bartone et al. (2009) and Ellyson et al., (2012) studies.

In the educational field, several studies have analyzed the relationship of the Conscientiousness Trait and school administration providing valuable information in this topic of research. One of those research studies was carried by Myers (2003), who analyzed the personality trait profiles of school administrators in the state of Texas who worked in schools ranked as high performing. According to the investigation, out of all the school administrators evaluated, elementary level administrators provided the highest level of conscientiousness when compared with middle or high school. This can be attributed to the responsibilities of taking care of younger students in a more organized and focused way, accompanied by the reality that more parental involvement exists at this educational level providing a sense of professional expectation (Myers, 2003).

On a different research approach, Jannesari, Irvani, Masaeli, Dareshori, and Ghorbani (2013) analyzed the relationship between transactional and Laissez-Faire leadership approach with personality traits of school administrators. Bass and Avolio (1991) described the transactional leadership approach as one that is led by a system of punishment and rewards to keep the focus of its members as they achieve a particular goal. On the other hand, Laissez-Faire leadership is described as an approach where members from the organization make the decisions themselves without consulting with the leader (Bass & Avolio, 1991). The results of the study by Jannesari et al. (2013) demonstrated that a strong linear relationship exists ( $r = .42$ ) between the personality trait of conscientiousness and transactional leadership. On the contrary, it was not surprising to see the weak relationship ( $r = -.14$ ) between Laissez-Faire and conscientiousness. The

researchers concluded that the strong correlation transactional leadership has on conscientiousness is due to the personal expectation of the leader to achieve, taking into consideration all the external factors that accompany each organization (Jannesari et al., 2013).

**Openness to experience and school administrators.** The trait of Openness to Experience embraces the idea that individuals may have the ability to open their imagination to explore new ideas through creative ways and be willing to try new things (Goldberg et al., 2006; Judge et al., 1999; Thalmayer et al., 2011). Judge et al. (1999) pointed out that there is only a small percentage of individuals in leadership positions who demonstrate high scores on this trait, but on the contrary and in general terms, leaders tend to feel more comfortable with routines and a conservative mindset. This finds particularly to be true to individuals with many years of experience in the profession and who have worked in a particular setting for a longer period of time (Thalmayer et al., 2011). Regarding the trait of Openness to Experience in relation to school administrators, Judge et al. (1999) found that a weak relationship exists between the two.

Analyzing personality traits in the context of military cadets at the academy and field training, Bartone's et al. (2009) research concluded that there was no indication that a relationship existed on the trait of Openness to Experience. The researchers demonstrated that most likely due to the context with which participants were expected to conform, this trait did not fit well to the regulated environment at West Point (Bartone et

at., 2009). In this case, military participants are expected to comply with a very specific set of rules and expectations and that ambiguity or creativity is seldom allowed as part of the training process. In a similar way, the study carried by Xu, et al. (2011) also did not provide sufficient data to link this trait with the practice in the medical field in China.

In the educational field, Oreg and Berson (2011) analyzed how transformational leadership affected organizational change concerning the Big Five personality traits. Their research specifically focused on the way school administrators handled a school district's organizational change through the lens of the leader's personality (Oreg & Berson, 2011). The data was collected through a total of 75 school administrators and analyzed using a Portrait Value Questionnaire (Oreg & Berson, 2011). In this particular situation, the researchers found that school administrators were open to trying new ideas in transitional organizational times for the sole purpose of satisfying the demands brought forth by the teachers in the district (Oreg & Berson, 2011). At the same time, this study also demonstrated a positive relationship between transformational relationship ( $\beta = .37$ ) and the trait of Openness to Experience, which supports Bartone et al. (2009) idea that the trait of Openness to Experience may provide information that can be used to understand how individuals might respond under different circumstances.

**Agreeableness and school administrators.** The Agreeableness Trait focuses on trust and the idea of creating a cooperative environment where everyone involved is respected and is part of a team (Judge, et al., 1999). Individuals who score high on this trait have a tendency to work well with others and are open to the needs of everyone in

the group (Thompson, 2008). Something that needs to be considered is the perception people have of this trait as cultural environment influences how respect and trust are defined (Xu et al., 2011).

According to Judge et al. (1999), research on the agreeableness personality trait is very limited compared to the rest of the traits in the Big Five personality trait theory. One of the few studies was carried by Ashton et al. (2012) who found that a weak relationship existed between agreeableness ( $\beta = .10$ ) and leadership in a transformational leadership approach. In a different study, Xu et al. (2011) identified that a strong relationship existed between ethical leadership ( $\beta = .40$ ) and agreeableness through his research with Chinese medical doctors. In their study, the researchers questioned if the collected data would provide similar results if given to doctors from different cultural background when analyzed in comparison with ethical leadership (Xu, et al., 2011).

Concerning agreeableness and school administrators, Tatlah et al. (2012) found that a small and significant relationship ( $\beta = .27$ ) existed with this personality trait in school administrators. The relationship seems to be stronger particularly in a people-oriented leadership approach at the elementary and high school level. The researchers suggested that this could come as a result that school administrators tend to put their trust in the work of their teachers and staff hoping that the results will be the same (Tatlah et al., 2012). In the same study, school administrators who demonstrated a task-oriented leadership approach denoted a negative relationship ( $\beta = -.14$ ). In this case, it is suggested

that the negative correlation comes as a result of the administrator's interest in completing the assigned tasks as opposed to the well-being of others (Tatlah et al., 2012).

**Neuroticism and school administrators.** Neuroticism leadership trait focuses on the negative and destructive behavior that an individual in power might have within an organization (Hersey, Blanchard, & Johnson, 2007). An increase in the amount of research is being done focusing on the way leaders take advantage of their positions to deviate from the goals and objectives of the organizations they represent for not only personal gain but to intentionally harm others (Thoroughgood, Tate, Sawyer, & Jacobs, 2012). According to Schyns and Schilling (2012), a leader who displays destructive behaviors will most likely cause irreversible damage to the organization and its employees. Such actions may be as simple as not abiding by the organization's rules and policies, to bullying, dishonesty, harsh verbal treatment, and harassment (Schyns & Schilling., 2012).

On the contrary with all the other traits in the Big Five personality trait theory, neuroticism is associated with a negative form of leadership that can cause irreversible consequences within and outside of the organization (Chamorro-Premuzic & Furnham, 2014; Thoroughgood et al., 2012). All individuals, including those in leadership positions, have some form of neurosis. The problem with this trait comes when individuals tend to demonstrate a higher degree of this trait being affected by struggling with making decisions or even dealing with daily stressful situations (Thoroughgood et al., 2012).

Cavazotte, Moreno, and Hickman (2012) analyzed a group of school administrators in relation to transformational leadership and their effectiveness. This study demonstrated that a significant and strong negative relationship exists between neuroticism ( $\beta = -.60$ ) and transformational leadership. Xu, et al. (2011) analyzed the relationship that neuroticism has on ethical leadership and found similar negative results ( $\beta = -.29$ ).

A similar study by Ali et al. (2011) on effective school principals across Iran supported the findings proposed by Cavazotte et al. (2012) reporting that the relationship between administrative leadership and neuroticism in the areas of human relations was  $r = -.27$ , instruction  $r = -.42$ , and general school administration  $r = -.38$ . In a different study, Tatlah et al. (2012) were able to identify that there was no relationship between task-oriented and people-oriented leadership approach in regards to neuroticism, but when a deeper analysis on vulnerability was compared to people-oriented leadership, a weak and not significant relationship ( $\beta = .11$ ) was found. When analyzing school administrative leadership, Jannesari et al. (2013), also found a weak correlation ( $r = .11$ ) in relationship to personality trait. The correlation came from school administrators who displayed transactional leadership qualities, as a result of the approach in leadership, where all members of the organization are led by a system of consequences and rewards (Jannesari et al., 2013). In the same study, the researchers found no relationship between neuroticism and the leadership approach Laissez-Faire. This can indicate that in a Laissez-Faire leadership approach, the members of the organization and the role of the

leader is distributed among every member of the organization and in such cases, neuroticism does not have an impact on the organizational decisions (Jannesari et al., 2013).

### **Current Research of Personality Traits, Technology Implementation and School Administration**

This section provides a summary of current research trends in personality traits, technology implantation, and school administration. Each research study provides valuable information emphasizing the need to further research personality traits and technology implementation. The findings from this literature review provide a foundation on which to build the intended research study. The findings focus on topics on how personality traits influence technology implementation, school administration, and learning.

Understanding the relationship that exists between the personality traits of individuals and the different aspects of the learning process provide valuable information that educators can use to develop the most appropriate instructional models to meet the needs of their students (Eryilmaz & Kara, 2017). Understanding personality traits also allow educators and school administrators to individualize instruction by creating lesson plans that will meet the needs of every student under their care (Ali, Bowen, & Deininger, 2017; Ercan, 2017). However, it is not just the educators that need to understand their own personality traits, but school administrators as they provide



guidance, vision, and set the expectations needed for school programs to function properly (Atli, 2017).

Karwowski, Lebuda, Wisniewska, and Gralewski (2013) found that a relationship exists between perceived personality traits, creative abilities, and academic achievement. The results of the study demonstrated that a relationship exists as a result of each individual's perceived creative self-efficacy and creative personal identity. The strongest relations between creativity and personality traits were noted particularly on the traits of Openness to Experience ( $r = .39$ ) and Neuroticism ( $r = -.57$ ). On the personality trait of Conscientiousness, the researchers found that a correlation also exists ( $r = .27$ ), in the same way for the Extraversion trait ( $r = .27$ ). The study went even further to analyze the difference that exists between self-perceived creativity and gender. Self-efficacy and personality traits among women were positively related to the personality trait of Extraversion and negatively related to the personality trait of Agreeableness. On the contrary, men demonstrated a positive relation to Conscientiousness. Both genders coincided with a positive relationship in the personality traits of Openness to Experience and Extraversion and a negative relationship with Neuroticism.

Eryilmaz and Kara's (2017) research concur with the research performed by Karwowski et al. (2013) in the relationship personality traits have on individuals. The personality trait of agreeableness was observed to have a significant relationship for teachers during pre-service sessions ( $M = 34.53$ ;  $SD = 4.95$ ). Further analysis demonstrated that particularly the strong relationship of the personality trait of

agreeableness was influenced by the cultural background of the teachers ( $M = 36.98$ ;  $SD = 6.28$ ). Collective cultural and social structures influence the way teachers view themselves and their personality traits ( $\beta = 0.23$ ,  $t(198) = 2.88$ ,  $p < 0.01$ ). Interpersonal relationships, way of life, and work become important factors in the development of personality traits and how teachers perform professionally. In conclusion, the research study found a strong relationship between personality traits of school teachers and career adaptability. The findings also identified the importance social elements have on the development of specific traits.

Reinforcing the idea that personality traits play an important role in the personal and professional development of teachers, Atli (2017) researched the influence personality traits have on career maturity. The results from the study demonstrated that personality traits considerably predict career maturity ( $R = .35$ ,  $R^2 = .12$ ,  $p < .05$ ), particularly in the personality traits of neuroticism ( $\beta = -.158$ ), extraversion ( $\beta = .148$ ), openness ( $\beta = .109$ ), agreeableness ( $\beta = .090$ ), and conscientiousness ( $\beta = .083$ ). The findings provide school principals with information that can be used to assist them in the selection process of professional development opportunities of their teachers, particularly for those with high levels of neuroticism.

Focusing on the influence personality traits have on learning, Furnham (2012) examined how learning style, personality traits, and intelligence can predict student's academic success. The findings demonstrated that the personality traits of agreeableness and conscientiousness are positively related to the way students academically perform

when taking an exam. Even though a relationship was found between test taking and personality traits, a limited relationship was found on the area of the learning styles of the students (Furnham, 2012). Similar to Furnham (2012), Threeton et al. (2013) analyzed the relationship between personality traits and learning of students in technical educational programs. Even though multiple factors seem to influence the way students academically performed, when analyzed from a psychological perspective, the personality traits factor proved to be consistent in students' determining academic performance.

To further the analysis of personality traits and students' academic performance, Kim (2013) investigated the relationship between the Big Five personality traits and Kolb's learning styles in relation to academic performance at the university level. Results from the study demonstrated that a correlation existed between the academic grade students received and the personality traits of conscientiousness and extraversion. However, the study found that no correlation existed between the learning styles of students and the academic grades received, but on the contrary a positive relationship between the learning styles and personality traits. The research concluded that personality traits of students and their academic performance are more closely related than their learning styles (Kim, 2013).

Directly related to the learning process, Orvis, Brusso, Wasserman, and Fisher (2011) explored the relationship that exists between personality traits and online learning environments. Results from the study found that openness to experience and extroversion

correlated to the student's comfort level in an online learning environment. Similar to the study, Al-Dujaily, Kim, and Ryu (2013) found on a different research study that students with higher levels of the extraversion personality trait preferred learning environments where student have more control of the learning process, while students with lower levels of extraversion personality trait preferred more structured teacher directed learning environments. Expanding on the topic, Chang and Chang (2012) performed a quantitative study to find the relationship between personality traits, students' academic performance, and distance learning education. The correlational study involved 226 students enrolled in the Taiwanese educational system. The results of the study demonstrated that the personality traits of extraversion and neuroticism can directly determine student success in distance learning environments. Even though the research study recommended further research on the topic, the results conform to similar studies on personality traits and how each personality trait relates to the learning process depending on which instructional approach is utilized.

The current research study not only focuses on personality traits, but also on school principals and technology implementation. The following findings will present what current research says in the areas of school administration and technology implementation. The findings provide a broader understanding of the research topic and expand on what is presented in previous sections.

In the area of school administration, even though insufficient research has been reported on best practices for increasing the effectiveness of a school leader, Brown

(2014) recommended school administrators consider using a constructivist instructional approach that includes a continuous intentional improvement plan to safeguard the learning process from antiquated and obsolete methodologies that might bring fruitless academic results. Understanding each educational context becomes a crucial element as recommendations are made in the process of finding viable solutions for successful technological implementations (Sincar, 2013). Educational technology leaders are responsible for continuously analyzing the best practices with the available technologies, keeping at the center of their decisions, the academic success of the students (Brown, 2014). In a similar topic, Waxman, Boriack, Lee, and MacNeil (2013) analyzed 311 public school principals on their perception of the importance technology has in each school by using a qualitative online survey approach. The results suggested that school administrators perceive technology as a critical component in the process of communicating information and providing instruction (Waxman et al., 2013). The attitudes of the principals towards technology and how it is used in the school setting clearly influences the teacher's use and implementation (Waxman et al., 2013). Principals are technology leaders who have the power to affect the success of the implementation of technology in their schools (Waxman et al., 2013).

A successful leader in educational technology is not only responsible for understanding and diagnosing the needs of a school setting but also able to align district policies, procedures, and protocols to the abilities of each teacher for the purpose of meeting the needs of each student (Brown, 2014). Sincar (2013) studied the challenges

administrators face when implementing technology in an educational system where bureaucracy, limited resources, cultural resistance to change through educational innovations, limited training opportunities, and high poverty levels exist. The gathered data for the study came from a qualitative study where 15 elementary school principals in Turkey, chosen through maximum variation sampling technique and representing low, medium, and high socioeconomic status, were voluntarily interviewed. The results of the study demonstrated that each school administrator faces unique challenges that are depended to each particular location and specific culture that need to be taken into consideration when considering technology implementations (Sincar, 2013). Not all research-based recommendations will be equally successful in all school situations (Sincar, 2013).

On the topic of technology implementation and school administration, Kowch (2013) analyzed the role of the school administrator utilizing a contextual administrative approach defining the concepts of leadership and management as a foundation for understanding emerging educational leaders. Data was collected through a quantitative survey approach. The study pointed to the academic preparation of leaders at the post-secondary level. The findings suggested that college level courses should include not only knowledge-based instruction in school administration but also leadership and institutional organization competencies that would enable future school administrators to make appropriate decisions (Kowch, 2013). In a somewhat contrary idea, Camille Rutherford (2016) proposed that technology leadership used to rely exclusively on the

school office, where a school administrator sought after calendars, record keeping, development of calendars, communication with the community, finances, and even implementation of technologies. With the arrival of many web-based technologies, most of the administrative responsibilities are now accessible to anyone anywhere (Rutherford, 2016). Teachers now have the ability to keep up with a robust amount of information, share it with colleagues or community members, or even collaborate with other people without leaving their classroom setting (Rutherford, 2016). If tech-enabled teachers, with the proper support and infrastructure from the school administrators, are given the opportunity to lead, many positive changes can happen to improve the educational system and better serve the needs of students and their surrounding communities (Rutherford, 2016).

The process of preparing educational technology leaders must be taken seriously by higher educational professionals (Persichitte, 2013). Howell, Reames, and Andrzejewski (2014) concurred with this idea by stating that it is the responsibility of educational leadership programs at the college level to adequately prepare future school administrators and equip them to embrace the idea of utilizing technological devices for learning purposes. In some contexts, higher education can easily disconnect themselves from the reality of the educational profession in the field and immerse themselves in theoretical frameworks that do not meet the needs in the real world (Persichitte, 2013). Many college level professors agree that the current programs do not adequately prepare students with real-life experiences in the educational field (Howell et al., 2014). It is the

responsibility of the leaders at the higher educational level to prepare the next generation of educators by providing a balanced academic program (Howell et al., 2014; Persichitte, 2013). Providing a balanced academic program is possible by becoming involved at multiple educational levels and constantly analyzing and researching what might be the best practices to ensure better learning outcomes (Persichitte, 2013).

From the academic preparation of those in the education profession to the actual implementation in the field, McDonagh and McGarr (2015) researched the integration of technology at post-primary schools in Ireland and the influence policymakers and individuals in leadership positions have on the academic effectiveness of their students. Data was collected using a qualitative interview approach from 37 information and communication technology coordinators from 37 different schools concurred that one of the major difficulties within the Irish educational system is the perception people have in regard to technology implementation. According to McDonagh and McGarr (2015), Irish people define technological implementation as the act of acquiring technological devices rather than its utilization and practical application for educational purposes. Comparable to Sincar's (2013) recommendation, McDonagh and McGarr (2015) recommended that policymakers and those in leadership positions must take into consideration the needs of individuals in the teaching profession when creating policies. The result of this process will be to transition, as a system, from an "electronic janitor to a pedagogical leader" (McDonagh & McGarr, 2015, p.66). The idea that technology implementation comes from the acquisition of digital devices could be a result that many teachers or school



administrators are still going through a digital culture shock (Hardy, 2015). Many of the educators of today have made it through elementary, high school, and even college without using Google or even a computer (Hardy, 2015). Changes take time, even if it means to wait for those individuals who are not willing to adapt to retire and let the younger generation bring forth the necessary changes (Hardy, 2015). In the meantime, creating a technology leadership team where all stakeholders form part of the decision-making process can provide a foundation in the process of transforming and improving the way instruction is given (Hardy, 2015).

Weng and Tang (2014) focused their study on the relationship between technology leadership strategies and elementary school administrators. Their research was divided into four topics which guided their study and data collection. The analyzed topics were how school administrators utilized technology leadership, characteristics of effective school administration, the relationship of technology leadership strategies with administrative effectiveness, and concluding their analysis to determine if those strategies could predict the effectivity of the school administrator (Weng & Tang, 2014). The quantitative data was collected using an online survey from 323 school administrators that worked at 82 elementary schools in Taiwan and analyzed using one-way ANOVA. The results showed that elementary school administrators tend to be aware of technology leadership strategies ( $M = 4.56$ ) and that significant differences in effectiveness existed with administrative positions [ $F(7.85, p = .00), n^2 = .101$ ] and age [ $F(4.72), p = .00$ ]. The findings also revealed that school administrators 50 years of age and older performed

better than those 30-39 years of age, indicating that a relationship exists between technology leadership strategies and the effectiveness of elementary school administrators (Weng & Tang, 2014). The study concluded that the correct utilization of technology leadership strategies in elementary schools could potentially predict the effectiveness of the school administrator (Weng & Tang, 2014).

Akman (2016) examined attitudes teachers have toward the implementation of technology that is used for instructional and the influence school administrators have in the implementation process. The data was gathered from 160 teachers and analyzed using a five-point Likert scale. A direct relation ( $R^2=0.29$ ,  $p < 0.01$ ) was found between teacher's expectations and interests in regard to the implementation and use of technologies for educational use. The study provided valuable information regarding the attitudes teachers have towards technology implementations in the school setting. With the findings, school administrators can create feasible implementation plans taking into consideration the basic technological knowledge each teacher has to be able to provide appropriate professional development opportunities (Akman, 2016). The study also concluded emphasizing what Richardson, Beck, LaFrance, and McLeod (2016) and Howell et al. (2014) previously stated regarding the responsibility universities have which is to provide the necessary tools for future educators to be better prepared to meet the needs of their field (Akman, 2016). Ganapati and Reddick (2016), on the other hand, displayed a high interest in the analysis of the importance of information technology to public administration educational programs to better prepare school administrators to

handle the technological demands in the field (Ganapati & Reddick, 2016). The Internet has changed the way people communicate and handle information, such as cyber security, which has quickly shaped how policies and procedures need to be managed at school administrative level (Ganapati & Reddick, 2016). The authors acknowledged that information technology in the educational field is very important (Ganapati & Reddick, 2016).

Based on the research study by Hughes, Bocklage and Ok (2016), school administrators need to be trained in the nuances of public and private school administration before taking an active role in the profession. When school administrators are given the proper training, they will then consider developing a learning-focused vision for the implementation of technologies utilizing a collaborative approach where the input from all stakeholders are taken into consideration (Hughes et al., 2016). This approach must be accompanied by an intentional long-term plan to systematically analyze best practices that would fit the needs of the learning community at any given time (Hughes et al., 2016). Once this is in place, encouraging ongoing conversations with all stakeholders must be considered as a priority in the process of exploring new decision-making processes, resources, and a shift in roles that would support the necessary changes (Hughes et al., 2016). The aforementioned recommendations must be supplemented by an adequate professional development plan that will ensure all members of the educational institution with the necessary training to accomplish the expected tasks (Hughes et al., 2016). The professional development training should take place before

and after any technological implementation considering various ability levels (Hughes et al., 2016).

Understanding the role school administrators have in regard to technology implementation can be complex and understudied (Hughes et al., 2016). For elementary school educators across the Taiwan educational system educational, technology leadership is proven to be an important requisite for holding administrative positions according to a research study by Hsieh et al. (2014). School administrators must be not only knowledgeable of current available technologies, but also have an understanding of how those technologies will best meet the needs of the learning communities they serve (Akman, 2016; Hsieh et al., 2014). The role of the school administrator transcends the administration and can directly affect the decision-making process into feasible actions that can bring positive changes through successful implementation and the use of technologies in the classroom. (Hsieh et al., 2014). In other words, the school administrator is responsible for bringing positive technology leadership that can ensure student academic success (Hsieh et al., 2014). This can be accomplished when clear vision and technology implementation plans are shared with school employees and when appropriate training is provided (Hsieh et al., 2014). When school administrators include teachers in the implementation and visioning process, the end result will be more positive student learning attitudes and achievement (Hsieh et al., 2014).

Christensen and Rogers (2013) concur with the aforementioned findings adding that technology leaders must stay current with emerging technologies and find ways to

use them to assist students with learning disabilities or language barriers. Research has concluded that audiovisual technologies have significantly improved student's learning abilities (Christensen & Rogers, 2013). It is in the hand of the technology leader to find and incorporate the most useful technologies in the classroom for the purpose of improving the accessibility of grade-level educational materials to all students, ultimately individualizing instruction (Christensen & Rogers, 2013). But in many cases, such as the ones in many urban school districts, a struggle still exists on how to keep up with technology, as well as how to find ways to afford the demands of managing instructional approaches that incorporate technology to educate their students (Holt & Burkman, 2013). One way that school administrators could mitigate some of the challenges urban schools face is by employing individuals who are considered digital natives and have the ability to not only enhance the way instruction is given on a daily basis but serve as a positive influence within each school by role modeling different ways technologies can be applied under various circumstances (Holt & Burkman, 2013).

Bringing change to any educational institution can be very difficult and challenging, especially when it relates to technology innovations at the school setting (Reid, 2016). Staff and teachers, in particular, are known for struggling to change ways to teach and communicate (Reid, 2016). For such, school administrators must be intentional in the process that needs to be followed ensuring that school staff is taken into consideration when decision are made providing a solid support system (Reid, 2016). Paying attention to the individuals involved is extremely important to the success of any

implementation. School administrators are not only managers but leaders who must know how to engage their employees in the whole implementation process (Reid, 2016). In a similar way, Webster (2016) researched the philosophical point of view of school administrators in regard to technology. Data for the study was collected through a qualitative survey. The analysis of the study concluded that school administrators perceive the role of a technology leader as one that keeps up with technology and finds ways to stay current with the latest devices, that is open to the idea of change and concerned about ensuring that all of the students are given the proper education that will prepare them for the future (Webster, 2016). According to Webster (2016), educational technology leaders are influenced by the assumptions they have in regards to technology and their philosophy of technology implementation, which have a great influence in the decision-making processes.

To explain and provide solutions to some of the aforementioned challenges many school administrators and technology leaders face on a regular basis, Bleakley and Mangin (2013) developed a case narrative to explain what these individuals have to deal with within the K-12 educational system. Their case narrative takes the reader through a scenario where the main character is confronted with ambiguities in terms of the way technology should be used for instructional purposes, as well as provides the opportunity to reflect on the process needed for technology leaders to create a vision and acquire support for a successful implementation. The authors pointed out that most American

schools have created the necessary conditions for technology implementation by providing adequate access to technology and training (Bleakley & Mangin, 2013).

### **Summary**

The current literature review provides information on personality traits and school administration regarding the LoTi at the school setting. Technology is an important part of everyone's life that cannot be ignored (Ertmer et al., 2012) as it is changing and influencing the way instruction is given in the classroom setting. Even though such constant change makes some people feel uncomfortable (Perrota, 2013), new instructional approaches using technology are helping students be better prepared for the challenges of our changing world (Ruggiero & Mong, 2015).

With the arrival of new technological devices that enhanced the communication and transfer of knowledge throughout history, the topic of the implementation of technology for educational purposes has and continues to be discussed (Ertmer et al., 2012). Recently, with the arrival of more sophisticated computers and portable handheld devices, the paradigms in education on how to effectively transfer knowledge is and continues to change (Ertmer et al., 2014). To adapt to the new paradigms, educators and school administrators must be provided with the necessary training and professional development opportunities to meet the academic needs of their students (Ertmer et al., 2012).

Personal characteristics, such as personality traits of educators and school administrators, are essential to the success of the learning process of students

(Csikszentmihalyi & Wong, 2014; Fibuch, 2011). Research shows that personality traits of school administrators need to be taken into consideration. Every community is different as, in the same way, not all individuals have the same personality traits and leadership styles. However, school leaders have the ability to become role models if they take into consideration their personality traits and personal experiences, which could bring significant positive changes to their local communities (Levin & Schrum, 2014).

Identifying the appropriate personality traits of school administrators when considering implementation of technologies at the school level can potentially provide valuable insight to any educational system. The findings of the literature review reinforce the idea that a relationship exists between technology implementation and personality traits. However, limited information on the topic can be found, particularly in regards to technology implementation and personality traits at the secondary school level demonstrating that there is a need for continued research. The analysis provides recommendations on the importance of identifying personality traits of school administrators and how personality traits can positively influence school climate and culture, so appropriate technological implementations in school settings can take place supporting the intent of the current research study.

Chapter 3 provides a description of the methodology for the research study, research design, sampling and sampling procedures, data collection, instrumentation, and procedures for data analysis. Validity and reliability of the chosen instruments are also



provided. The chapter concludes with a description of ethical considerations by the researcher for the study.

### Chapter 3: Research Method

The purpose of this study was to test the relationship between the LoTi and the personality traits of Adventist school principals in North America. The success of an educational program can be influenced by the personality traits and behaviors of those in administrative or leadership positions (Lounsbury, Sundstrom, Gibson, Loveland, & Drost, 2016). Technology is one of the elements that, due to the impact it is having on the society, has influenced the ability of school administrators to lead and directly influence how student learning takes place (Rollins & Bailey, 2014). It is crucial for school administrators to identify and understand their own personality traits and how they relate to the way technology is handled and implemented at the school under their care (Lounsbury et al., 2016).

Chapter 3 is structured into four sections. The research design and rationale section, the methodology section, the threats to validity section, and the ethical procedures section.

#### **Research Design and Rationale**

A quantitative correlational research design was chosen to investigate the relationship between the personality traits of Adventist school principals and the LoTi. A quantitative research design allowed a statistical analysis of the variables in study where a comprehensive conclusion was reached using unbiased information. The independent variables of the study were the personality traits of Adventist school principals and the dependent variable were the LoTi. The independent variable of personality traits were:

extraversion, openness, conscientiousness, neuroticism, and agreeableness. The dependent variable of technology implementation consists of eight levels that range from non-use to refinement.

A correlational design was appropriate compared to other designs for the intent of the research study, as it offered the benefit of identifying associative relationships between variables by measuring the strength of their relationship. The design facilitated a correlation analysis to determine whether the variable of each personality trait exhibits a significant relationship with the LoTi.

Due to the total number of school principals working in Adventist schools across North America,  $N = 799$ , and the location of the participants, a quantitative research design allowed the collection of data to be done using an online survey tool. Thus the interaction between participants and the researcher were minimized avoiding any type of influence on the responses from the participants. Statistical analysis of the collected data served as a way of providing conclusive and meaningful evidence for the proposed research question. The chosen method allowed the findings to be analyzed and interpreted using standardized processes in order to answer the research question.

Due to the difference that exists between a quantitative and qualitative research design, a qualitative design was not chosen. A qualitative research design is primarily exploratory and requires the collection of data using participant's narratives and researcher observations of the participants at their natural setting to explain why and how phenomena occur (Creswell, 2013). It allows the researcher to describe phenomena

considering local contexts, as well as determine how each participant interprets constructs potentially limiting the ability of the researcher to generalize the findings (Johnson & Onwuegbuzie, 2004). As a result, most qualitative research studies provide a rich and contextualized understanding of specific aspects of the human experience (Polit & Beck, 2010). In a qualitative research design, data collection mostly comes from personal interviews, group discussions, and observations (Creswell, 2013), which for the research study such approach was very difficult to accomplish due to the distance and cost factors. Employing a qualitative research design would primarily provide information regarding the opinions and personal interpretations of the factors involved in the phenomenon to be studied. On the contrary, a quantitative research allowed the researcher to test a hypothesis and validate already constructed theories (Johnson & Onwuegbuzie, 2004). It also allowed the researcher to generalize findings from an adequate number of participants by investigating the research questions and identify the strength of the relationship between the variables in the study (Johnson & Onwuegbuzie, 2004). Since a qualitative research design does not fit the intent of the research study, a mixed methods approach will not be considered. An experimental or quasi-experimental research design was not considered either, as both designs requires the researcher to manipulate at least one of the variables, whether the participants are randomly chosen or not, to measure change (Creswell, 2013).

## **Methodology**

The population of the intended research study was school principals employed and actively working within the Adventist educational school system in North America. The Adventist educational system is the second largest private educational system in the world. It provides educational services to students from early childhood to university levels. At the time of the research study, a total of 8,514 educational institutions existed. Out of the total number of educational institutions, 114 were higher educational institutions, 50 were worker training institutions, 2,435 were secondary schools, and 5,915 were elementary schools. The total number of enrolled students was 1,954,920. As part of the provided information, 13 higher institutions, 122 secondary schools, and 677 elementary schools with a total of 84,907 students were located in North America. Schools within the North American region were located across the United States, Guam, Canada, and Bermuda (Adventist Education, 2018).

For the purpose of responding to the research question, Adventist school principals from across the United States, Guam, Canada, and Bermuda provided an accurate representation of the various communities, personality traits, and technology implementations. All 799 potential Adventist school principals at k-12 levels in North America, were invited to participate. Individuals in vice principal or other leadership roles, other than those in school principal positions, were excluded for the reason that they might not have all of the decision-making authority and could possibly perceive things differently than if they held a position as principal. All K-12 levels were

considered for the research study because the way the Adventist educational system is setup. Since the Adventist educational system is a private school system, most of the schools were considered small schools with multi-grade levels and followed the same chain of command from the North American Division offices located in Maryland.

### **Sampling and Sampling Procedures**

A convenience sampling was used for the research study. Convenience sampling is a type of non-probability sampling technique where the researcher selects the subjects that are conveniently accessible. In this case, participants from the entire population of school principals working at Adventist schools in North America who voluntarily participate in this study formed its sample. Since the total number of school principals was 799, the researcher aimed at reaching every school principal to collect the necessary data. By using a convenience sampling approach, the researcher was also able to achieve an adequate sample size in a relatively fast and inexpensive way.

A database of all Adventist schools' physical addresses and emails of principals were made available to the researcher through the department of education of the North American Division as posted yearly on the department's website. Participant's involvement in the survey were approved by the department director, potentially increasing the participation rate. All Adventist school principals in North America, as listed on the North American Division database, were chosen and invited to participate via email. The researcher excluded only those Adventist school principals employed in the state of Arizona to avoid any form of potential bias due to the researcher's

involvement. Even though research studies have demonstrated that online surveys provide a low response rate (McPeake, Bateson, & O'Neill, 2014), Liu and Inchausti (2017) found that the survey design is as important as the content of the survey, something that was carefully taken into consideration before reaching out to each potential participant.

In order to determine the sample size using Kendall's Tau-b, the researcher followed the research study by Bonett and Wright (2000). Suspecting a correlation of .40, with a confidence interval of .3, an alpha of .05 the needed sample size was 57 (Bonett & Wright, 2000).

### **Procedures For Recruitment, Participation, and Data Collection**

In order to collect the data from the participants, the instruments that were used are LoTi Digital Age Survey for Leaders and Big Five Inventory (BFI). Both instruments were combined into one survey using the LoTi Connection online platform. Collection of data from participants took place after receiving IRB approval. A payment to LoTi Connection was made to use the LoTi Digital Age Survey. On the other hand, the BFI is a public domain instrument and does not require any permission for its use as long as the instrument is utilized for research purposes. Once approval was granted by IRB, a formal request was emailed to the Vice President for Education of the North American Division of Seventh-day Adventist church asking for permission to conduct the research involving Adventist school principals under his supervision (See Appendix A). A clear explanation of the purpose of the study was included in the letter.

After approval from IRB and the Education Department Director of the Adventist educational system, all Adventist school principals in North America were emailed an invitation letter to participate explaining the purpose of the research and the measures taken to guarantee that the information provided was confidential (See Appendix B) including an informed consent form (See Appendix C). Individuals interested in participating responded to the email with the words I consent and the email address were the link to the survey needed to be sent. The researcher manually entered the email of only those individuals agreeing to participate into the LoTi Connection server. Upon receiving and responding to the survey questions, participant's answers were automatically saved into the LoTi Connection server. All participants were given 30 days to complete the survey. Reminder to participate emails were sent out every 5 days after the original email (See Appendix D). All data collected was kept confidential and only used for data analysis by the researcher and the research committee.

### **Instrumentation and Operationalization of Constructs**

In order to collect the necessary information, an online survey was created using the LoTi Connection platform combining the LoTi Digital Age Survey for Leaders and the Big Five Inventory. The LoTi (LoTi) Digital-Age Survey for Leaders was used to measure the LoTi and the Big Five Inventory (BFI) test was used to measure the personality traits of Adventist school principals.



### **LoTi Digital-Age Survey for Leaders**

The LoTi (LoTi) Digital Age Survey for Leaders provided the research study with the necessary information to assess the LoTi of Adventist school principals. In order to utilize the survey a permission to use the survey letter was received by LoTi Connection. The survey was designed in 1995 by Dr. Christopher Moersch and utilized in various school settings to measure the levels of technology implementation (Moersch, 1995).

The LoTi Digital Age Survey for Leaders consists of 50 questions that inquired about the digital landscape, leader perceptions, school climate, expectations for classroom resource use, standards-based learning, and the leader expectations for specific uses of digital resources during instruction (LoTi Connection, 2018). The participants were asked to respond to each statement using a Likert Scale based on a frequency scale. Each of the questions in the survey relate to a particular LoTi (TI), Current Instructional Practices (CIP), Digital Resources (DCR), Personal Computer Use (CPU), Student Resource Use (SCU), Teacher Resource use (TCU), and Standards-Based Learning (SBL). Questions 4, 16, 17, 23, 38, and 45 focuses on levels of technology implementation 1 and 2. Questions 1, 5, 8, 37, and 40 focuses on LoTi 3. Questions 27, 30, 31, 36, 43, and 46 focuses on LoTi 4. Questions 10, 14, 21, 22, and 47 focuses on LoTi 5 and 6. Questions 12, 19, 25, 42, 48 focuses on DCR. Questions 13, 15, 18, 26, and 49 focuses on PCU. Questions 6, 20, 32, 41, and 50 focuses on CIP.

Scoring of the Digital Age Survey for Leaders was automatically performed by the LoTi Connections platform using the LoTi Digital Age Survey Quick Scoring Device.

The steps followed by the LoTi Connection platform to determine the LoTi were as follows:

Step 1. Collect the frequency for each corresponding question's field name from the classroom practices (SCU), use of resources (TCU), and standards-based learning sections (SBL).

Step 2. Add scores for category totals.

Step 3. Apply the category totals to the following if/then scoring statements. If a scoring statement reads false using the category totals, then the researcher must move to the next statement. If a scoring statement reads true, the resulting LoTi is received (LoTi Connection, 2018).

The following are the scoring statements used to identify the LoTi.

- If ( $SBL \leq$  than question 2); then the LoTi is 0.
- If ( $Level\ 5/6 \geq$  than question 21); and ( $Level\ 4a/4b \geq$  than question 27) and ( $Level\ 3 \geq$  than question 24) and ( $PCU \geq$  than question 24) and ( $CIP \geq$  than question 31) and ( $CSU \geq$  than question 4) and ( $TCU \geq$  than question 4); then the LoTi is 6.
- If ( $Level\ 5/6 \geq$  than question 16) and ( $Level\ 4a/4b \geq$  than question 22) and ( $Level\ 3 \geq$  than level 24) and ( $PCU \geq 20$ ) and ( $CIP \geq$  than question 28) and ( $SCU \geq$  than question 3) and ( $TCU \geq$  than question 3); then the LoTi is 5.

- If (Level 4a/4b  $\geq$  than question 16) and (Level 3  $\geq$  than question 22) and (CIP  $\geq$  than question 25) and (SCU  $\geq$  than question 3) and (TCU  $\geq$  than question 3); then the LoTi is 4b.
- If (Level 4a/4b  $\geq$  than question 12) and (Level 3  $\geq$  than question 22) and (PCU  $\geq$  than question 25) and (SCU  $\geq$  than question 3) and (TCU  $\geq$  than question 3); then the LoTi is 4a.
- If (Level 3  $\geq$  than question 20) and (PCU  $\geq$  than question 12) and (CIP  $\geq$  than question 17) and (SCU  $\geq$  than question 2) and (TCU  $\geq$  than question 2); then the LoTi is 3.
- If (Level 1/2  $\geq$  than question 19) and (PCU  $\geq$  than question 8) and (CIP  $\geq$  than question 13) and (SCU  $\geq$  than question 2) and (TCU  $\geq$  than question 2); then the LoTi is 2.
- If ((level 5/6  $\geq$  than question 7) or (Level 4a/4b  $\geq$  than question 7) or (Level 3  $\geq$  than question 7) or (Level 3  $\geq$  than question 7) or (Level 1/2  $\geq$  than question 7) or (DCR  $\geq$  than question 7) or (PCU  $\geq$  than question 7) or (CIP  $\geq$  than question 7)) and (SCU  $\geq$  than question 1) and (TCU  $\geq$  than question 1); then the LoTi is 1.

The LoTi Digital Age Survey for Leader's eight levels of technology implementation range from Non-use (Level 0) to the level of Refinement (Level 6). As individuals progress from one level to the next, specific instructional changes occur that can be easily identified (Moersch, 1995). Digital Age School leaders are the ones that

make the decisions to implement the technologies at their schools. Also, they are the ones who are responsible for choosing which type of professional development opportunities are needed for a successful implementation based on their views of what is happening at the classroom level. Table 1 describes the different levels and a description of each one of them.

Table 1

*LoTi Digital Age Survey for Leaders Levels of Technology Implementation (LoTi Connection, 2018)*

<b>Level</b>	<b>Category</b>	<b>Description</b>
0	Non-use	A perceived lack of access to technology or lack of time to pursue electronic technology implementation.
1	Awareness	Computer-based applications have little or no relevance to the individual.
2	Exploration	Technology is used as a supplement to the program.
3	Infusion	Technology-based tools, including databases, spreadsheets, calculators, multimedia applications, desktop publishing applications, and telecommunications applications are frequently used.
4 (a)	Integration: Mechanical	Technology-based tools, such as multimedia, telecommunications, databases, or word processors, are used as part of daily life.
4 (b)	Integration: Routine	Technology-based tools are used to identify and solve authentic problems relating to everyday situations.
5	Expansion	More complex and sophisticated use of digital resources and collaboration tools in the learning environment.
6	Refinement	Collaborations extend beyond the school setting that promote authentic problem solving. No longer a division exists between everyday work responsibilities and digital tools/resources within the learning environment.

For over 20 years the LoTi Digital-Age Survey has undergone intensive research to ensure its statistical validity (LoTi Connection, 2018). Research studies demonstrated the validity of the survey in the areas of content, construct, and criterion validity (LoTi Connection, 2018; Mehta, 2011; Mehta, V., & Hull, D. M., 2013; Stoltzfus, 2009). In

1995, Stoltzfus (2009) lead a team of instructional technology professionals who evaluated the content of the LoTi Digital Age Survey, arriving to the conclusion that the instrument provides content validity. Construct validity was found through a research study conducted by Mehta and Hull (2013) using an exploratory factor analysis demonstrating that the factor of technology implementation provided a factor loading above .40 for all the included items. Stoltzfus (2009) analyzed the criterion validity of the instrument using Spearman's rank correlation coefficient between TI levels and STaR charts. STaR is a computer adaptive standardized assessment that measures the academic level of students in the areas of literacy, math, and reading (Foster, 2017). The correlation analysis demonstrated that a strong positive association exists between the two instruments ( $r_s = 0.704$ ,  $p < 0.0001$ ) (Stoltzfus, 2009).

Since the creation of the LoTi Digital Age survey in 1995, researchers have tested the reliability of the instrument. Moersch (1995), and Schechter (2000) analyzed the internal consistency of the instrument from the obtained data. Table 2 demonstrates the score reliability using Cronbach's Alpha from the LoTi (TI) of the survey.

Table 2

*Score Reliability for LoTi Digital Age for Leaders Survey (Mehta, 2011)*

	TI
Moersch (1995)	0.74
Schechter (2000)	0.7427

### **Big Five Inventory (BFI)**

The personality traits of school principals was measured using the Big Five Inventory (BFI). BFI is a 44-statement instrument that is answered using a 5-point Likert Scale, which does not require ample amount of time to complete. Participants are asked to rate how well each statement describes them. Possible responses range from 1 to 5 as follows: 1 (Disagree Strongly), 2 (Disagree a Little), 3 (Neither Agree nor Disagree), 4 (Agree a Little), and 5 (Agree Strongly). The instrument measures the strength of the five personality traits: Openness to experience, Conscientiousness, Extroversion, Agreeableness, and Neuroticism (Allen, 2015).

The internal consistency of each personality trait were tested by Goldberg (1993). The results of the research study provided a high coefficient alpha for each trait, as shown in Table 2. Such results demonstrate the internal consistency of the five personality dimensions used in this study. Also, the instrument is listed as public domain and is available for research use (Rammstedt, 2007).

Table 3

*Internal consistency of the Big Five Inventory (Goldberg, 1993)*

Big Five domain	Number of items	Coefficient alpha
Openness	10	0.84
Conscientiousness	9	0.79
Extroversion	8	0.87

Table 2 Continue

Table 2 Continue

Agreeableness	9	0.82
Neuroticism	8	0.86

Construct validity of the Big Five Inventory survey was demonstrated by a research study performed by Hee (2014). Hee (2014) conducted an exploratory factor analysis for the Big Five personality traits. The results of the factor analysis demonstrated that the factor loadings for each of the personality traits ranged from 0.573 to 0.803. Content validity was conducted by a group of expert researchers led by Morizot (2014), who analyzed the items of the questionnaire and concluded that the instrument has adequate content validity (Morizot, 2014). Morizot's (2014) research study demonstrated that a strong positive association exists between the BFI items and NEO-PI-3 (NEO Five-Factor Inventory-3) outcome scales providing criterion validity ( $r_s = .804, p < 0.0001$ ). NEO-PI-3 is a questionnaire that measures the Big Five personality traits domains (openness, conscientiousness, extraversion, agreeableness, and neuroticism) and the six facets that define each domain (Le Corff & Busque-Carrier, 2016).

For each of the five personality dimensions, the BFI contains 8 to 10 personality items/statements for each dimension (Costa & McCrae, 2011). The scoring methodology for the instrument consists of 28 of the 44 statements that are scored using a direct scoring approach from the values assigned by the participants for each of the statements.

Sixteen of the 44 statements are scored using a reversed scoring approach. The total scores are then computed by combining the direct and reverse score statements of the self-reported personality item in order to find the mean score for each dimension. The mean scores are computed by adding the total scores for each dimension and dividing them by the number of questions associated with each dimension (Goldberg, 1993). Table 3 shows the layout of the personality statements showing which of the statements require reverse scoring, represented by an R next to the number of the statement.

Table 4

*Personality Dimension Statements (Goldberg, 1993)*

Dimension	Statements
Extraversion	1, 6R, 11, 16, 21R, 26, 31R, 36
Agreeableness	2R, 7, 12R, 17, 22, 27R, 32, 37R, 42
Conscientiousness	3, 8R, 13, 18R, 23R, 28, 33, 38, 43R
Neuroticism	4, 9R, 14, 19, 24R, 29, 34R, 39
Openness	5, 10, 15, 20, 25, 30, 35R, 40R, 41, 44

### Data Analysis

The data analysis to investigate the LoTi and the personality traits of Adventist school principals and began with a screening process of the collected data to ensure that minimal sample size was achieved. Since the participants responded the survey questions using the LoTi Connection online services, the collected data was automatically tabulated and statistically analyzed for the LoTi Digital Age Survey for Leaders section providing the researcher with the levels of technology implementation for each leader who filled out the survey. The overall levels of technology implementation score were automatically



produced by the LoTi Connection from the participants responses in the survey submitted through the LoTi Connection and used for the statistical analysis.

For the BFI survey section, the researcher used Microsoft Excel to calculate the scores following the appropriate scoring methodology for the instrument as previously described in this chapter. Each personality dimensional score was calculated by averaging the item scores included in each dimension to identify and describe if a relationship might exist between each personality trait and the LoTi.

Since the LoTi provided ordinal data and each personality trait dimension provided continuous data, the non-parametric correlational test Kendall's Tau-b was used for the statistical analysis to find the strength and direction of the relationship between the chosen variables for the research question (Laerd Statistics, 2018). Kendall's Tau-b is a non-parametric measure of the strength and direction of relationships between two sets of ranked data where  $-1$  implies a perfect negative association,  $+1$  implies a perfect positive association, and  $0$  implies that no monotonic relationship exists between variables (Laerd Statistics, 2018). Kendall's Tau-b statistical analysis will be performed using SPSS statistics software.

The relationship between the dependent variable, technology implementation, and independent variable, personality traits, was examined to address the research question restated below.

RQ1: What is the relationship, using Kendal's Tau-b, between the level of technology implementation and each of the personality traits: extraversion, openness, conscientiousness, neuroticism, and agreeableness of Adventist school principals?

*H1<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of extraversion of Adventist school principals.

*H1<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of extraversion of Adventist school principals.

*H2<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of openness of Adventist school.

*H2<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of openness of Adventist school.

*H3<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of conscientiousness of Adventist school.

*H3<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of conscientiousness of Adventist school.

*H4<sub>O</sub>*: There will be no significant relationship between the personality trait of neuroticism of Adventist school principals and the level of technology implementation.

*H4<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of neuroticism of Adventist school.

*H5<sub>O</sub>*: There will be no significant relationship between the level of technology implementation and the personality trait of agreeableness of Adventist school.

*H5<sub>A</sub>*: There will be a significant relationship between the level of technology implementation and the personality trait of agreeableness of Adventist school.

Raw data from the surveys downloaded to Excel spreadsheets was transferred to SPSS Statistics software. Interpreting results were accomplished by generating tables using SPSS Statistics software ensuring that the collected data passed the assumptions set by Kendall's Tau-b that a monotonic relationship between variables exist and that variables are measured on an ordinal and continuous scale. In addition, a scatterplot was created to test the assumptions. Upon confirmation that the assumptions are met, Kendall's Tau-b was used to calculate each independent variable paired with the LoTi scores from the LoTi Digital Age for Leaders survey to determine the strength of the association for each of the research question. Values for an 80% confidence interval was summarized and presented using a matrix generated by SPSS Statistics that included the significance value and sample size on which the calculation were based (Laerd Statistics, 2018).

### **Threats to Validity**

Creswell (2013) refers to threats to validity as research design issues that may influence the way a researcher reaches conclusions from the collected data. According to

Onwuegbuzie (2000), identifying threats to validity is important as it can guide future research studies (p. 10). Threats to validity are categorized as internal or external. However, according to Onwuegbuzie (2000) threats should be referred as internal and external replication (p. 11). In other words, threats to validity include any threat that could prevent the study from being performed using the same sample, setting, context, and time or findings replicated among different groups of people, settings, context, and time (Onwuegbuzie, 2000). The three stages of the research process where internal and external validity can occur are research design/data collection, data analysis, and data interpretation (Onwuegbuzie, 2000). For the purpose of providing strong validity, the researcher took all necessary measures to minimize any threats throughout the stages of the inquiry process.

### **Threats to Internal Validity**

**History:** The internal threat of history refers to any changes that may occur between a first or second measurement (Creswell, 2013). Since the intend of the research was to find if personality traits relate to the LoTi at a specific point in time, the internal threat of history was minimized.

**Maturation:** As this threat deals with any changes that may occur during the course of the study that might have a determining effect on the outcome (Creswell, 2013), the collection of data occurred within a four-week period of the same school year. In general, changes on personality traits of the participants and the LoTi were not expected to change within such short period of time. However, a potential threat could have

happened during this period if a participant decided or was asked to leave the organization. In that case, the participant would have been removed from the list of participants before responses could be provided. The information collected at a specific point in time was considered valid and analyzed with the rest of the participants.

**Regression:** The statistical regression threat refers to potential participants who are likely to provide extreme scores on the dependent variable (Creswell, 2013). Since the purpose of the research was to find if personality traits influence the LoTi, the responses provided by individuals with exceptional characteristics were compared with the rest of the participants providing an accurate picture of all of the pooled individuals.

**Selection:** The selection threat could potentially provide an inaccurate representation of the general targeted population if only the chosen participants display one particular set of skills or characteristics (Creswell, 2013). To avoid the selection threat, all Adventist school principals in North America were invited to participate providing a balanced representation across the United States, Guam, Bermuda, and Canada where the emphasis, expectations, curriculum standards, and technology use are the same for teachers and principals working for the system regardless of their location.

**Mortality:** The mortality threat focuses on the fact that many participants drop out of the study as a result of various reasons (Creswell, 2013). By using a survey that was easy to answer and could be completed in a matter of few minutes, the researcher hopes to minimize the mortality threat.

**Testing:** The internal threat of testing is when data can be influenced by participants knowing ahead of time the provided questions on the instruments (Creswell, 2013). Since the chosen instruments are not commonly used within the Adventist educational system and were combined into one survey, the likelihood of any participants knowing the provided questions were almost non-existent.

**Instrumentation:** The instrumentation threat could affect the outcomes in the way it is written (Creswell, 2013). In order to avoid any misunderstandings, reliable and valid instruments were chosen to collect the necessary data.

**Effect of testing:** The effect of testing threat refers to the influence that external factors may have on the responses from the participants potentially changing the outcome and generalization of the study (Trochim, 2006). Since the researcher is not using a pre and posttest, but an online survey tool that follows standardized procedures to collect and analyze the data that minimizes contact with the participants, the threat was minimized.

**Effects of experimental arrangements:** The threat relates to the fact that participants know that they are being studied potentially modifying their responses from what it could have been otherwise (Trochim, 2006). To minimize the threat, confidentiality of the responses was clearly emphasized to the participants at the beginning of the survey.

### **Threats to External Validity**

Threats to external validity is referred to as any factor that can affect the generalizability of the results in a given research study (Laerd Statistics, 2018). Four

common threats to external validity are selection and treatment, effects of experimental arrangements, constructs, methods and confounding, and history effects and maturation. Most of the threats to external validity were discussed and presented as part of the internal validity of the study.

Selection and treatment: The threat of selection and treatment refers to the narrow group of participants and the generalization of the results to all individuals in the particular field of study (Trochim, 2006). For the current research, claims gathered from the collected data were specifically attributed to those individuals in Adventist school administrative positions within North America.

### **Threats to Conclusion Validity**

The threat to conclusion validity may take place by a wrongful interpretation of the data about the relationship between variables (Trochim, 2006). The two potential common mistakes about measuring relationships is concluding that no relationship exists when in reality one does exist or concluding that a relationship exists when in reality there is no relationship at all (Trochim, 2006). A way to avoid the threat to conclusion validity was to ensure that the research had at least the needed sample size of 57 participants. Another way to reduce the threat was by having more participants than the minimum sample size and ensuring that there was enough representation from all geographical locations. Adding to the conclusion validity process, the chosen instruments has already proven to be reliable in similar contexts and research studies.

## **Ethical Procedures**

All ethical concerns were considered throughout the whole process of the research. IRB's permission was received before conducting any data collection or requesting permission from the North American Division of Seventh-day Adventists Education Department (09-18-18-0338299). All individuals invited to participate had the opportunity to do so voluntarily and could stop or withdraw their participation at any time. Only professional adults were allowed to participate. When data was analyzed, every participant was given a random ID number to ensure confidentiality. Upon completion of the research study, findings were shared with the professional community without providing any personal information of any of the participants. Collected data was kept secured in the researcher's password protected personal computer inside a password protected file. Only researcher and committee members had access to the collected data. Data was only disseminated in a generalized way as part of the research study. Collected data will be destroyed after 5 years or when required by university's guidelines.

The researcher's current employment at the time of the research study was with the Arizona Conference of Seventh-day Adventist in the education department, a member of the North American Division of Seventh-day Adventist church. The researcher had no oversight or influence on any Adventist schools outside the state of Arizona. As a result, no Adventist schools within the state of Arizona were used for the research.



### **Summary**

This chapter provided an explanation of the chosen research design and rationale of the quantitative research study. A description of the targeted population is provided with an explanation of the intended sampling approach and how the collection of data will take place. The instrumentation was explained with the reasons why the instruments would best fit the purpose of the study. The collection and analysis of data are discussed providing information on how they will be used for study. Finally, the threats to validity were discussed and the ethical procedures that will be followed.

Chapter 4 presents the results of the data analysis of the collected set of information providing the statistical interpretation and explanations that led to the final conclusions of the research study.

## Chapter 4: Results and Data Analysis

Prior research studies demonstrated that little was understood about the relationship between the personality traits of school principals and technology implementation at the school (Barczyk & Duncan, 2017; Knezek & Christensen, 2016). Consequently, the purpose of this quantitative correlational research was to examine the relationship that between technology implementation and each of the personality traits of a sample of Adventist school principals. The results described in this chapter constitute new knowledge and, thus, contributed to closing the literature gap on the topic of technology implementation and personality traits of school principals.

The two instruments that were used to collect data were the LoTi Digital Age for Leaders and the Big Five Inventory. LoTi Digital Age for Leaders collected information pertaining to the LoTi. The levels are Non-use (Level 0), Awareness (Level 1), Exploration (Level 2), Infusion (Level 3), Integration Mechanical, (Level 4a), Integration Routine (Level 4b), Expansion (Level 5), and Refinement (Level 6). The Big Five Inventory measured the strength of the five personality traits: openness to experience, conscientiousness, extroversion, agreeableness, and neuroticism.

Responses were collected from Adventist school principals and analyzed to answer the following research question:

RQ1. What is the relationship, using Kendall's Tau-b, between the level of technology implementation and each of the personality traits: extraversion, openness, conscientiousness, neuroticism, and agreeableness of Adventist school principals?

Five null and alternative hypotheses were given for the research study:

*H1<sub>O</sub>* There will be no significant relationship between the level of technology implementation and the personality trait of extraversion of Adventist school principals.

*H1<sub>A</sub>* There will be a significant relationship between the level of technology implementation and the personality trait of extraversion of Adventist school principals.

*H2<sub>O</sub>* There will be no significant relationship between the level of technology implementation and the personality trait of openness of Adventist school.

*H2<sub>A</sub>* There will be a significant relationship between the level of technology implementation and the personality trait of openness of Adventist school.

*H3<sub>O</sub>* There will be no significant relationship between the level of technology implementation and the personality trait of conscientiousness of Adventist school.

*H3<sub>A</sub>* There will be a significant relationship between the level of technology implementation and the personality trait of conscientiousness of Adventist school.

*H4<sub>O</sub>* There will be no significant relationship between the personality trait of neuroticism of Adventist school principals and the level of technology implementation.

*H4<sub>A</sub>* There will be a significant relationship between the level of technology implementation and the personality trait of neuroticism of Adventist school.

*H5<sub>O</sub>* There will be no significant relationship between the level of technology implementation and the personality trait of agreeableness of Adventist school.

*H5<sub>A</sub>* There will be a significant relationship between the level of technology implementation and the personality trait of agreeableness of Adventist school.

The remainder of Chapter 4 summarizes the collected data, provides a description of the data analysis, and presents the data analysis results.

### **Data Collection**

Upon receiving approval from Walden IRB and the Education Department of the North American Division of Seventh-day Adventist Church, all 799 Adventist school principals were emailed an invitation letter to participate in a survey. Individuals interested in participating responded to the email with the words “I consent”, and the email address where the link to the survey needed to be sent. Completion of the survey took approximately 25 minutes to complete. The researcher manually entered the email addresses of only those individuals agreeing to participate in the LoTi Connection server. Upon receiving and responding to the survey questions, participant’s answers were automatically saved into the LoTi Connection server. All participants were given 30 days to complete the survey. Reminder to participate emails were sent out every 5 days after the original email. All data collected was kept confidential and only used for data analysis by the researcher and the research committee.

Out of the 799 Adventist school principals, 113 responded with their consent to participate. Four emails returned as no longer being available. Out of the 113 Adventist

school principals that provided consent, 66 completed the survey and 9 started the process but left it incomplete. All incomplete surveys were not considered for the data analysis. Data was collected using the LoTi Connection online platform. Completed survey's raw data scores were downloaded from the LoTi Connection platform into a Microsoft Excel spreadsheet and used for statistical analysis using SPSS Statistics Software.

Responses received were provided by Adventist school principals who live and work in various regions across the United States. This element provided the researcher with a representative sample of other Adventist school principals who work throughout the North American Division. However, even though the research study exceeded the expected minimum sample size for Kendall's Tau-b of 57, only 66 or 8% of the total number of Adventist school principals in the North American Division participated. There were no data collection discrepancies from the plan presented in Chapter 3.

### **Demographic Information**

The only demographic information collected for the research study pertained to the years of experience in education that Adventist school principals had at the time of completing the survey. Table 5 shows the distribution of the years of experience in education from all participants who completed the survey. Four levels of experience in education were provided; less than 5 years, 5-9 years, 10-20 years, and more than 20 years.

Table 5

*Distribution of the Years of Experience in Education*

Years of experience	Frequency	Percent
<5 years	3	5
5–9 years	8	12
10–20 years	23	23
> 20 years	32	32

**Results****LoTi Results**

Scoring of the Digital Age Survey for Leaders was used following the LoTi Digital Age Survey Quick Scoring Device. The LoTi Digital Age Survey for Leader's eight levels of technology implementation range from Non-use (Level 0) to the level of Refinement (Level 6). Individuals at level 0 (non-use) demonstrate a lack of access to technology or lack of time to pursue electronic technology implementation. Those at Level 1 (awareness) demonstrate that computer-based application have little or no relevance. At Level 2 (exploration), individuals use technology to supplement a program. At Level 3 (Infusion) technology-based tools, including databases, spreadsheets, calculators, multimedia applications, desktop publishing applications, and telecommunications are frequently used. At Level 4a (integration: mechanical) the use of technology-based tools, such as multimedia, telecommunications, databases, or word processors, become part of daily life. At Level 4b (integration: routine) technology-based tools are used to identify and solve authentic problems relating to everyday situations. At Level 5 (expansion) more complex and sophisticated digital resources are used to

collaborate throughout the learning process. At Level 6 (refinement) individuals collaborate beyond the classroom setting promoting authentic problem-solving eliminating a division between everyday work responsibilities and digital tool/resources within the learning environment. LoTi level scores of each Adventist school principal are provided on Appendix E. Table 6 provides the LoTi level results by showing the number of school principals on each level and the percentage it represents.

Table 6

*LoTi Level of Adventist School Principals*

LoTi level	Number of principals	Percentage
0	2	3
1	21	31.8
2	17	25.8
3	14	21.2
4a	2	3
4b	4	6.1
5	5	7.6
6	0	0

**Big Five Inventory Results**

The scoring methodology for the Big Five Inventory instrument consists of 28 of the 44 statements that are scored using a direct scoring approach from the values assigned by the participants for each of the statements. Sixteen of the 44 statements were scored using a reversed scoring approach. The total scores were then computed by combining the direct and reverse score statements of the self-reported personality item in order to

find the mean score for each dimension. The mean scores were computed by adding the total scores for each dimension and dividing them by the number of questions associated with each dimension (Goldberg, 1993). Table 7 provides the mean scores of each Adventist school principal for each of the personality traits.

Table 7

*Big Five Inventory Mean Scores of Adventist school principals*

School Principal	Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
1	0.375	1.667	1	-0.25	1.7
2	1.75	1.667	2.222	-0.5	1.8
3	1.5	1.444	0.889	0.222	1.9
4	0.375	0.444	0.889	0.375	0.9
5	-0.125	0.111	0.667	1.375	1.4
6	1.25	1.556	0.445	1.5	2.1
7	1.875	0.778	1.222	-0.625	1.8
8	0.125	1.778	0.556	-1.111	1.4
9	1	1.667	0.556	-1.375	1.3
10	0.375	0.333	1	-1.111	1.2
11	0.5	1.222	0.556	0.5	2.1
12	1.125	1.778	1.444	-0.125	0.9
13	0.875	1.778	1.111	-1	1
14	1.125	1.556	1.111	-0.125	1.9
15	-0.625	0.444	0.778	0	1.4
16	1.5	1	1.333	0	1.8
17	0.375	0.889	1.111	0.75	1.2
18	1.25	1	0.889	0.222	1.2
19	1	0.889	2.222	-0.625	1.2
20	0.5	2	1	-1.125	2
21	0	0.778	0.778	0.75	1.6
22	-0.125	1	1.556	0.375	1.7
23	0.25	1.556	1.444	-0.125	2
24	2.25	1.889	0.556	-0.75	1.8
25	0.125	1.667	1.889	-0.625	1.5

Table 7 (Continue)



Table 7 (Continue)

26	1.25	1.778	1.667	-1.375	1.6
27	0.25	1.444	1	0	1.7
28	1.75	1.778	2.222	-1	1.6
29	-0.125	0.333	0.556	0.5	1.6
30	1.625	1.444	1	-0.5	2.2
31	1.25	0.889	0.556	0.125	1.1
32	0.5	0.0667	1.333	0.625	1.4
33	1.75	1.778	1.444	-0.875	2
34	1.625	1.556	2.222	-0.75	1.9
35	-0.25	0.889	0.889	0	1.3
36	1.625	2.111	1.333	-1	1.7
37	1.375	2	2.222	-1.111	1.8
38	1.125	1.889	0.778	-0.875	1.2
39	1	1.556	1.556	-0.625	1.7
40	0.875	1.667	0.556	1.125	1.8
41	1.875	1	1.333	-0.125	2.2
42	1.375	1	0.667	0.625	1.4
43	1.625	1.111	0.556	-0.25	1.8
44	0.5	1.111	0.778	0.875	1.2
45	0.375	1.222	1	0.625	1.3
46	0.625	0.889	1	0.875	1.6
47	1.5	1.889	1.333	-0.75	1.1
48	-0.75	0.556	1	0.875	1
49	0.25	1	1.222	-0.875	1.6
50	1.625	2.222	2.222	0.222	1.6
51	1.25	1.111	1.778	0.125	1.5
52	1.125	1.222	1.222	-0.5	1.5
53	0.25	1.444	1.556	-0.125	1.1
54	1.5	1.111	1.778	-0.75	1.5
55	0.625	1.222	1.667	-0.25	1.5
56	1.25	2.111	2	-0.5	1.6
57	0	1.667	2.111	0.375	1.5
58	1	1.444	2	-0.625	1.5
59	0.75	1	0.889	0.125	1.9
60	1	1.667	1.444	-1.125	1.7
61	-0.5	0.778	0.889	0	1.6
62	1.125	1.444	1.889	-1	1.6
63	1	2	1.778	-0.5	1.1
64	1.125	1.111	0.889	0.875	2.2

Table 7 (Continue)

Table 7 (Continue)

65	1.125	1.222	1.333	-0.75	1.4
66	1.7	0.667	0.778	0.375	1.7

To better understand the mean scores for each dimension, the range of all Adventist school principals for each dimension are provided on Table 8. The information provides the opportunity to see if the principal's mean scores was on the low or high end of the range.

Table 8

*Range for the Mean Scores of the Big Five Dimensions*

Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness
Low – High	Low – High	Low – High	Low – High	Low – High
-0.625 – 1.875	0.333 – 2.222	0.556 – 2.222	-1.125 – 1.222	0.9 – 2.2

### **Analysis of Data**

After the participants completed the survey, all of the collected raw data were transferred from LoTi Connection platform into a Microsoft Excel spreadsheet. The levels of technology implementation were automatically calculated by the LoTi Connection platform, following previously described scoring steps. Mean scores for each of the personality traits were manually calculated by the researcher following previously described BFI scoring procedures. The data was statistically analyzed using SPSS Statistics software. A relationship between participants' LoTi and the mean scores of each personality trait from all participants was computed using the non-parametric

correlational statistical analysis Kendall's tau-b. The results from each Kendall's tau-b analysis described the strength of the relationship between the levels of technology implementation and each personality trait of Adventist school principals.

A Kendall's tau-b correlation was run to determine the relationship between the LoTi and the personality traits amongst 66 Adventist school principals. Table 8 shows the results of the Kendall's tau-b correlation analysis between the LoTi and the personality traits.

Table 9

*Correlation between LoTi levels and the personality traits using Kendall's tau-b (n= 66)*

	LoTi	
	$\tau_b$	Sig.
Extraversion	.253	.007
Table 9 (Continue).		
Agreeableness	.118	.215
Conscientiousness	.177	.063
Neuroticism	-.157	.095
Openness	.229	.017

The results suggested that there was a weak-moderate correlation between the variables of extraversion and the LoTi ( $\tau_b = .253$ ,  $p = .007$ ). Because the p value was less than 0.05, it indicated that the correlation was statistically significant. The cut off points that were used to determine the strength of a weak moderate correlation were 0.1 to 0.35 (Schaefer, Williams, Goodie, & Campbell, 2004). Based on the given statistical results, the proposed null hypothesis between the variables of extraversion and the LoTi was rejected.

The statistical results between the variables of agreeableness and the LoTi suggested that there was a weak correlation ( $\tau_b = .118, p = .215$ ), but the correlation was not statistically significant. Based on the given statistical results, the proposed null hypothesis between the variable of agreeableness and the LoTi was not rejected.

The statistical results between the variable of conscientiousness and the LoTi suggested that there was a weak correlation ( $\tau_b = .177, p = .063$ ), but the correlation was not statistically significant. Based on the given statistical results, the proposed null hypothesis between the variable of agreeableness and the LoTi was not rejected.

There was a weak negative correlation between the variables of neuroticism and the LoTi ( $\tau_b = -.157, p = .095$ ), but the correlation was not statistically significant. Based on the given statistical results, the proposed null hypothesis between the variable of neuroticism and the LoTi was not rejected.

There was a weak-moderate correlation between the variables of openness and LoTi ( $\tau_b = .229, p = .017$ ), because the p value was less than 0.05 it indicated that the correlation was statistically significant. Based on the given statistical results, the proposed null hypothesis between the variable of agreeableness and the LoTi was rejected.

A post hoc statistical power analysis was performed using G\*Power 3.1 software. Since the strength of correlations in each research question are between .15 and .25, then .15 and .25 was used to run a post hoc power analysis. Based on the sample size of 66, using a two-tailed, an alpha of .05, for the relation strength of .15, the real power is .22.

For the relation strength of .25, the real power is .53. Therefore, the real power based on the five research questions are between .25 and .53.

### **Summary**

The purpose of this quantitative correlational study was to examine the relationship between the LoTi and the personality traits of Adventist school principals. To address the research question, the LoTi Digital Age survey for Leaders and the Big Five Inventory were analyzed. The LoTi of each school principal and the mean scores of each of the personality traits; extraversion, openness, conscientiousness, neuroticism, and agreeableness of each school principal were identified. The total sample size of the study was  $n= 66$  Adventist school principals. Kendall's tau-b was used to find the relationship between the LoTi and the personality traits of Adventist school principals. The results suggest that there was a weak-moderate correlation between the variables of extraversion and openness and the LoTi indicating that the correlations were statistically significant. Based on the statistical results, the proposed null hypothesis in Research Questions 1 and 5 were rejected. There was a weak correlation between the variables of agreeableness, conscientiousness, and neuroticism and the LoTi. Yet the relationships were not statistically significant. Based on the statistical results, the proposed null hypothesis were not rejected.

The interpretation of the findings is addressed in Chapter 5. The chapter provides a summary and interpretation of the findings, provides a discussion of the theoretical

implications, limitations of the study, provides recommendations for further research, and conclusion.

## Chapter 5: Conclusions and Discussions

### Introduction

The purpose of this study was to identify whether there is a relationship between the LoTi and the personality traits of Adventist school principals. Research has shown that little is understood about the relationship between the personality traits of school principals and technology implementation at the school setting (Barczyk & Duncan, 2017; Knezek & Christensen, 2016). Even though I sought all Adventist school principals working in North America (N=799), all 66 participants who responded work in schools within the continental United States. This research study examined the relationship between the LoTi and the principals' personality traits of extraversion, openness, conscientiousness, neuroticism, and agreeableness. This chapter summarizes the results, provides an analysis of the data, discusses the theoretical implications, discusses the implications for social change, and provides recommendations for further study.

### Interpretation of the Findings

This research study examined the relationship between the levels of technology implementation and the personality traits of a sample of Adventist school principals. Five hypotheses were formulated; they proposed that a relationship existed between each of the personality traits and the LoTi. The results revealed that a relationship does exist between two of the five personality traits and the LoTi. A weak-moderate correlation was found between the personality traits of extraversion ( $r_b = .253, p = .007$ ) and openness ( $r_b = .229, p = .017$ ) with the LoTi, indicating that there was a statistically significant

correlation. The null hypothesis stated that there was no significant relationship between the personality traits of extraversion and openness and the LoTi. As a result, the null hypotheses were rejected, and the alternate hypotheses was retained.

The study also showed that there was no correlation between the personality traits of agreeableness ( $\tau_b = .118, p = .215$ ), conscientiousness ( $\tau_b = .177, p = .063$ ), and neuroticism ( $\tau_b = -.157, p = .095$ ), but the negative? correlation was not statistically significant. The null hypotheses for the personality traits of agreeableness, conscientiousness, and neuroticism were not rejected and the alternate hypothesis was rejected.

The findings suggest that Adventist school principals who score higher on the personality trait of extraversion are viewed as outgoing, like to be around other people, tend to be friendly, and are open minded (Judge et al., 1999). Judge and Zapata (2014) found that the personality trait of extraversion was an important trait for job performance in positions which required strong social skills. The results of the current research study concur with Tatlah et al. (2012), who identified that a moderate relationship exists particularly with school principals who are task-oriented. Judge et al. (1999) explained that such behavior can be attributed to the fact that individuals who are extroverts tend to relate well with other individuals, thus providing a goal-oriented approach to their leadership role, in this case, the technology implementation processes at their schools. Funder (2015) added that people with this trait are assertive and want to be part of discussions and feel affirmed.



Adventist school principals who score higher on the personality trait of openness may have the ability to open their imagination to explore new ideas through creative ways and be willing to try new things (Goldberg et al., 2006; Judge et al., 1999; Thalmayer et al., 2011). Judge and Zapata (2014) found that the personality trait of openness supported job performance in positions which offered leaders their independence in completing work. Judge et al. (1999) pointed out that there is only a small percentage of individuals in leadership positions who demonstrate high scores on this trait, but on the contrary, and in general terms, leaders tend to feel more comfortable with routines and a conservative mindset. In order for technology implementations to take place, results from the current research study indicate that being open may help technology integrations.

From the findings, it does not appear that the level of agreeableness, conscientiousness, or neuroticism positively influence technology implementation. However, this is contrary to findings from some previous research. Chamorro-Premuzic and Furnham (2014) found that individuals with a strong personality trait of agreeableness are friendly, considerate, generous, honest, and trustworthy, which are necessary characteristics that could contribute to a successful technology implementation. This statement was supported by Akman (2016) who found a direct relationship ( $R^2=0.29$ ,  $p < 0.01$ ) between teachers with this personality trait and their attitude towards technology. Judge et al. (1999) indicated that individuals with a strong personality trait of conscientiousness tend to be well organized and find effective ways to accomplish

organizational objectives. This is particularly true with school principals' perceived creativity and self-efficacy (Karwowski et al., 2013). Even though school principals who score high on neuroticism are more likely than average to be moody and to experience such feelings as anxiety, worry, fear, anger, frustration, envy, jealousy, guilt, depression, and loneliness (Acuna, Gomez, & Juristo, 2009), they can be mindful of their trait and seek alternative options towards technology such as the use of online resources that can fulfill their emotional and social needs (Watjatrakul, 2016) thus positively contributing to the technology implementation process.

The Big Five Personality Trait Theory focuses on the behavior individuals are expected to exhibit under particular circumstances. According to the theory, leaders, which would include Adventist school principals, who are born with certain personality traits that are correctly identified and nurtured, could potentially bring positive outcomes throughout the educational program (Fleener, 2006). Particularly for Adventist school principals, the results of the current research study demonstrated that a significant correlation exists between the personality traits of extraversion and openness and the levels of technology implementation. The Levels of Use of Innovation of the CBAM helped determine the degree of implementation of technology by school principals. In the current research study, the average LoTi of Adventist school principals was level 2 (exploration). The findings suggest that Adventist school principals who understand their personality traits, their comfort level with the use of technology, and seek professional

development opportunities geared towards their individual needs, could potentially increase the success with their technology implementation efforts.

The technology implementation process can be a complex task (Hughes et al., 2016). With the obtained results of this study it is reasonable to assume that Adventist school principals who are characterized to have positive emotions, engage with other individuals, generally tend to get enthusiastic about taking on new opportunities, and have intellectual curiosity to work with new and creative ideas will most likely be successful with technology implementations at their schools. School principals should not only understand their personality traits and be knowledgeable of current available technologies, but also understand how those technologies will best meet the needs of the learning communities they serve (Akman, 2016). School principals are responsible for bringing positive technology leadership that can assure student academic success (Hsieh et al., 2014).

When school principals, particularly those who score stronger in the personality traits of extraversion and openness, include teachers in the implementation and visioning process will most likely enjoy positive results with their technology implementation efforts (Hsieh et al., 2014; Reid, 2016). Findings from this research study demonstrate that Adventist school principals have the ability to successfully lead technology implementations at their schools if provided appropriate professional development opportunities, such as cognitive, instructional, or peer coaching and professional learning communities. While personality traits represent one factor towards success in technology

implementations, there are other factors that can result in success as well that were not measured by this study.

### **Limitations of the Study**

All Adventist school principals in North American were invited to participate, consequently limiting the generalizability of the findings to only Adventist school principals in North America. Another limitation came from the dependency of the way participants responded to the provided standardized survey. As a researcher, I had to rely completely on the responses provided by the participants and expect that their responses would provide accurate information. If the participants provided inaccurate information for the fear of protecting their image or status, some of the collected data could have provided inaccurate information and mislead to the wrong conclusions. Participants were informed of the confidentiality of their individual answers and encouraged to provide honest responses.

### **Recommendations for Further Research**

The research study was limited to finding the LoTi and the personality traits of Adventist school principals. Even though the purpose was to fill the gap in the literature on the topic of technology implementation and personality traits in the school setting, a future research study could be replicated to include teachers' personality traits, as they are the ones who are at the forefront of the technology implementation process. By doing so, the possibility of increasing the number of participants would increase the power of

the study and provide a true picture of the actual LoTi across all Adventist schools in North America.

A second recommendation for a future research study on a similar topic is to segregate the results by age or years of experience in education. By doing so, the researcher will be able to analyze the data and acquire a broader perspective of the influence, if any, age or years of experience in education have on technology implementation. It is important to acknowledge that society and technological advances have influenced the way instruction is given in schools, which can have an impact in the way responses are provided according to the age or years of experience in education of the participants.

### **Implications for Social Change**

This study has implications for social change: It is expected to bring awareness that Adventist school principals with stronger personality traits of extraversion and openness are more likely to implement technology. Identifying the personality traits of school principals will provide school districts with information that could enable individuals in administrative positions to reflect on how personality traits, including their own, may influence technology implementations and, thus, use the information to improve the quality of the educational program. School principals who are quieter and demonstrate higher levels in the personality traits of agreeableness, conscientiousness, and neuroticism can attain a higher LoTi by being more open to it and intentionally exhibiting more extraversion and openness qualities in their approach. Therefore, school

principals should understand their personality traits and how technology can be an integral part of their lives, which, according to Dawson (2012), can provide benefits that exceed the academics.

In today's society, becoming technologically literate is something that must always be kept on the forefront (Ertmer et al., 2012) requiring educational settings to provide young people with the necessary skills they need to meet the challenges of a rapidly changing world (Bacon, 2013). Consequently, researchers recommended that school districts provide adequate professional development, such as teacher coaching or the creation of professional learning communities, that would meet the needs of the learning community they serve (Khobidi et al., 2013; Koehler et al., 2013). Therefore, Adventist school principals have the ability to lead implementations at their schools if they take into consideration their personality traits and personal experiences, which could bring significant positive changes not only at their schools but to their surrounding communities (Levin & Schrum, 2014).

### **Conclusion**

The results from the statistical analysis indicated that a positive correlation was found between the personality traits of extraversion and openness with the LoTi. According to the findings, Adventist school principals with stronger personality traits of extraversion and openness are likely to have a better chance of successfully implementing technology at their schools. Adventist school principals with a stronger personality trait of openness will perform better independently and complete their work (Hsieh et al.,

2014; Reid, 2016). School principals with a stronger personality trait of extraversion will perform better in positions that require strong social skills (Hsieh et al., 2014; Reid, 2016). Findings from the literature review indicated that even though it does not appear that the level of agreeableness, conscientiousness, or neuroticism of Adventist school principals positively influence technology implementation, individuals who scored lower on the non-significant traits can still be open to the technology implementation process and be intentional in their technology implementation approach by displaying more extroversion and openness characteristics.

The study expanded on previous research studies on similar topics, such as Csikszentmihalyi and Wong (2014) and Halder et al. (2017), where it was demonstrated that personality traits influence the educational program particularly when technologies were used and, thus, contributed to closing the literature gap that currently exists regarding the LoTi and personality traits. Besides filling in the gap in the literature, the results of this study can provide a more balanced approach to the topic potentially benefiting school principals and school districts in better understanding the resources needed in the creation and selection of professional development targeting opportunities for school principals regarding current technology implementation practices.

The study met my objective as the data showed that there was a relationship between the LoTi and the personality traits of extraversion and openness to experience. The findings of the research study provided similar results to other studies and the principles of the CBAM and the Big Five Personality Traits Theory. The findings should

contribute to raising awareness of the relationship between the LoTi and the personality traits of school principals. School principals hold the key to the success of their educational programs, including any technology implementations.



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## Appendix A: Request Letter to Vice President for Education

RE: Permission to Conduct Research Study

Dear Vice President for Education:

I am writing to request permission to conduct a research study at all of the school within the North American Division. I am currently enrolled in the doctoral Educational Technology program at Walden University and in the process of writing my dissertation. The topic of study of my intended research is on the level of technology implementation and the personality traits of Adventist school.

I hope that I will be granted permission to recruit all K-12 school principals within the North American Division, to anonymously complete a LoTi Digital Age Survey and the Big Five Inventory survey (copy enclosed). Interested participants will be invited to voluntarily participate. An invitation email will be sent out including a consent form where participants will have to agree to participate before the survey can be completed.

If approval is granted, participants will complete the survey using the online LoTi Connection platform. The survey process should take no longer than 25 minutes. The survey results will be combined and analyzed for the dissertation project. Collected data will be kept confidential and anonymous. Should this study be published, only pooled results will be documented. No costs will be incurred by either schools or participants.

Your approval to conduct this study will be greatly appreciated. I can follow up with you to answer any questions or concerns you may have at that time. You may contact me by phone or email

Looking forward to hearing back from you soon.

Sincerely,

Gustavo Martin  
Doctoral Student  
Walden University

## Appendix B: Invitation Letter to Principals

Dear school principal,

I am inviting you to participate in a research study entitled: Level of Technology Implementation and the Personality Traits of Adventist School Principals. I am currently enrolled in the Educational Technology program at Walden University and in the process of writing my doctoral dissertation. The purpose of the research is to provide an insight on the level of technology implementation and the personality traits of school across Adventist schools in North America.

The chosen survey has been designed to collect information on the level of technology implementation at the school level, particularly in the areas of teaching innovation, current instructional practices, personal computer use, and an assessment on personality traits.

Your participation in this research project is completely voluntary. You may decline altogether or leave blank any questions you do not wish to answer. There are no known risks to participation beyond those encountered in everyday life. Your responses will remain confidential and anonymous. Data from this research will be kept under protected password and reported only as a collective combined total. No one other than the researcher will know your individual answers to the survey.

If you agree to participate in this project, please click on the I agree box on the consent section of the survey. Then, answer the questions on the survey as best you can. It should take approximately 25 minutes to complete. When completed, click submit and the information will be automatically collected.

If you have any questions about this project, feel free to contact me by phone or email.

Thank you for your collaboration in this important endeavor.

Sincerely,

Gustavo Martin  
Doctoral Student  
Walden University



### Appendix C: Reminder Letter to Participate

Dear school principal,

This is a follow-up letter inviting you to participate, if you have not already completed the survey, in a research study entitled: The level of technology implementation and the personality traits of Adventist school. The purpose of the research is to provide an insight on the level of technology implementation and the personality traits of Adventist school principals in North America.

If you agree to participate in this project, please mark the “yes” agree box and provide your preferred email on the consent section of the questionnaire before sending it back. Upon receiving your approval to participate, an email will be send to you by LoTi Connection with a link to the survey. Answer the questions on the questionnaire as best you can. Completion of the survey should take approximately 25 minutes. When completed, click submit and the information will be automatically collected.

If you have any questions about this project, feel free to contact me by phone or email.

Thank you for your collaboration in this important endeavor.

Sincerely,

Gustavo Martin  
Doctoral Student  
Walden University

## Appendix E: Individual LoTi Levels of Adventist School Principals

School Principal	LoTi level
1	4b
2	3
3	0
4	1
5	2
6	2
7	4a
8	1
9	2
10	3
11	3
12	2
13	1
14	4b
15	0
16	2
17	1
18	2
19	1
20	3
21	2
22	1
23	3
24	5
25	3
26	3
27	3
28	5
29	1
30	1
31	2
32	4a
33	3
34	5
35	1
36	1
37	5
38	1

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39	1
40	2
41	3
42	3
43	2
44	1
45	1
46	2
47	1
48	1
49	2
50	4b
51	2
52	4b
53	3
54	5
55	2
56	1
57	1
58	2
59	1
60	2
61	3
62	1
63	3
64	2
65	1
66	2

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