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CTO mentor program: examining the effectiveness of the CTO mentor program and its impact on the K-12 technology leader's career

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CTO MENTOR PROGRAM: EXAMINING THE EFFECTIVENESS OF THE CTO MENTOR PROGRAM AND ITS IMPACT ON THE K-12 TECHNOLOGY LEADER'S CAREER

A dissertation proposal submitted in partial satisfaction

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by

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TABLE OF CONTENTS

Page

LIST OF TABLES vii

LIST OF FIGURES viii

DEDICATION ix

ACKNOWLEDGEMENTS x

VITA xii

ABSTRACT xiii

Chapter One: Introduction 1

Background 2
Statement of Problem 5
Purpose and Nature of the Study 6
Research Questions 6
Theoretical Framework 7
Andragogy 7
Evaluating Training Programs. 8
Nature of Intervention 8
Importance of the Study 10
Research Assumptions 11
Limitations 12
Delimitations 12
Operational Definitions 12
Key Terms 14

Chapter Two: Literature Review 15

Evolution of Technology 15
Evolution of the Technology Leadership 20
Technology Leadership Roles. 21
Technology Leadership Traits 23
Technology Leadership Effectiveness. 25
Technology Leadership: Essential Skills Identified 25
Training Programs for Aspiring Technology Leaders 28
Adult Learning Theory 30
Mentoring – Background Information 35
Mentorship and Organizational Learning Process 37
The Mentoring Process 39
Predictable Phases of Mentoring 41
Qualities of a Successful Mentor and Mentee 42

CETPA CTO Mentor Program 45
Evaluation of Training Programs 47
Kirkpatrick – The Four Levels of Evaluation 50
Level one – Reaction 50
Level two – Behavior 51
Level three – Learning (Transfer) 52
Level four – Results 54
Other Evaluation Paradigms 54

Chapter Three: Methodology 58

Restatement of the Research Questions 58
Research Design 59
Data Sources 61
Instrumentation 62
Validity 64
Data Collection Procedures 68
Data Analysis 69
Limitations 71
Human Subjects Consideration and IRB Review 71
Summary 72

Chapter Four: Results 73

Restatement of Research Questions 73
Description of the Data Gathering Process 74
Survey Data Gathering Process. 74
Artifact Data Gathering Process. 75
Description of the Respondents 75
Description of the Survey Respondents. 75
Description of Portfolio Subjects. 77
Answers to Research Questions 77
Research Question 1. 77
Research Question 2. 90
Research Question 3. 95
Summary of Themes from the Research 120
Applicability. 121
Development. 121
Transferability. 121
Productivity. 121

Chapter Five: Discussion, Conclusions, and Recommendations 122

Brief Restatement of Findings 123
Applicability 123
Development. 124
Transferability. 124

Productivity. 125
Significance of Findings 125
Research Question 1. 125
Research Question 2 128
Research Question 3. 129
Unanticipated Outcomes and Surprises 131
Summary of Findings 134
Final Thoughts about the Literature 135
Conclusions 135
Implications 137
Implications for Practice. 137
Implications for Policy. 138
Recommendations for Future Research 139
Methodological Enhancements 139
Proposed Future Research 139
Final Summary 140

REFERENCES 142

APPENDIX A Request to Use Impact Questionnaire for Leadership Development Program 158

APPENDIX B Permission to Use Impact Questionnaire for Leadership Development Program 159

APPENDIX C Request to Use Kirkpatrick Methodology 160

APPENDIX D Permission to Use Kirkpatrick Methodology 161

APPENDIX E Request for CTO Mentor Program Information 162

APPENDIX F Impact Questionnaire for CTO Mentor Program 163

APPENDIX G Informed Consent Form 178

APPENDIX H IRB Approval 181

LIST OF TABLES

Page

Table 1. Four Levels of Learning in the Competency Model 38

Table 2. CTO Strands/Sub-strands 46

Table 3. Questionnaire Item Alignment to Research Questions 63

Table 4. Survey Items (Question 14) Pertaining to RQ1—Kirkpatrick's Level One (Reaction) and Adult Learning Theory—Sorted by Highest Level of Agreement 78

Table 5. Survey Items (Question 16) Pertaining to RQ2 Sorted by Highest Level of Agreement 91

Table 6. Question 15: Qualitative Responses 96

Table 7. Topics, Strands, and Learning Outcomes for the CTO Mentor Program 99

Table 8. Summary of the Findings by Research Question 134

Table 9. Program Considerations Aligned with Research 137

LIST OF FIGURES

Page

Figure 1. Concurrent embedded design with two layers of analysis 60

Figure 2. Demographic information: Cohort years represented. 74

Figure 3. Demographic information: Gender. 75

Figure 4. Demographic information: Race. 76

Figure 5. Demographic information: Age. 76

DEDICATION

First, I would like to dedicate this dissertation to my parents, Dr. Natalie Lowey Delcamp and Mr. John Lowe Delcamp. My parents taught me and my siblings to work hard, pay attention to detail, and always do your best. My mom inspired me to pursue this doctoral degree and I am truly honored to walk in her footsteps. I miss them both very much.

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ABSTRACT

In order to support the 21st century learning initiatives facing California K-12 educational agencies—including the influx of mobile devices, common core standards, online high stakes testing, and student privacy—an educational organization must employ a well-trained, knowledgeable, and effective technology leader. The California Educational Technology Professionals' Association's (CETPA) Chief Technology Officer (CTO) Mentor Program certification provides assurance that the chosen technology leader has been exposed to, is familiar with, has a working knowledge of, and can apply the leadership, educational, and technology skills necessary to be a successful technology leader.

The purpose of this mixed method study was to identify the extent to which differences exist before and after candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations. A second purpose of this study was to identify the degree to which CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives. The third purpose of this study was to identify the degree to which CETPA CTO graduates perceive the program's learning activities and objectives are relevant to their on the job performance. This study was conducted through the lens of Kirkpatrick's Four Levels of Program Evaluation.

The findings from this study suggest that the CTO Mentor Program provides a course of study that is relevant to the technology leader in K-12 educational agencies, meets the needs of adult learners, and provides a return on investment for the learner, his or her educational agency and the sponsoring organization, CETPA.

Chapter One: Introduction

Technology leadership has been the focal point of many formal studies spanning 10 years from 2001 (Courville, 2011; Drury, 2008; Maas, 2010). However, the emphasis has been placed primarily on the corporate world and higher education (Beatty, Arnett, & Liu, 2015; Weiss, 2010). At the same time, with the implementation of Common Core State Standards (CCSS) and computer adaptive testing beginning in 2014, K-12 education is shifting the focus from traditional learning models to 21st century literacy skills (Brady, Russo, & Osborne, 2012; Trilling & Fadel, 2009). Curriculum is changing to embrace new technologies and a globalized world, with an increased emphasis on virtual learning, online learning activities, and asynchronous interactions (Gibson, 2002). It is imperative to develop and employ technology leaders in the K-12 arena who are able to understand the entire organizational and educational structure, including the classroom and instructional strategies, and not just the traditional information technology infrastructure.

School districts vary greatly in the way technology leadership positions are viewed, as is evidenced by the different titles used, such as director, executive director, associate or assistant superintendent, Chief Technology Officer (CTO), and Chief Information Officer (CIO). Departments are referred to as technology, information technology, technology services, and information services, to name just a few (Consortium for School Networking [CoSN] CTO Council, 2006). In larger metropolitan areas, a school district will often employ a CIO or a CTO. The chief function of the CIO role includes participation in planning for organization strategy, information systems, and policy development, as well as managing information resources and overseeing the development of new systems (Weiss, 2010). In smaller, rural districts, technology

leadership often comes in the form of one person serving as both the network technician and the repair technician.

K-12 educational information technology (IT) leaders originally came from a data processing background and grew organically as the school district evolved. Often IT leaders came from the classroom, bringing their personal interest for technology integration to the leadership position. For those leaders who are not educators, many come with a formal IT education or bring with them their experience from business and industry (Mitchell & White, 2008).

A K-12 CTO's responsibilities involve much more than technology, as technology is no longer a means unto itself (Mitchell & White, 2008). As technology becomes more critical to any business, it is important that the CTO be positioned to influence the organization's strategy. This fact places the CTO in a position to gain influence through his or her *techpertise* (Medcof, 2008). Medcof (2008) also stated, "in most firms the CTO sits on the executive committee with the CEO, CFO, and other top executives and has an important role to play in leading the innovation of the organization" (p. 406). Each school district needs employees who are experts in networking and systems infrastructure, integrating technology into curriculum, and all other aspects of technology, but the cabinet-level CTO does not have to be the sole person with all of this knowledge (CoSN CTO Council, 2006). Implementing leadership preparation programs that encourage change and growth is imperative to developing new ways of thinking and behaving in order to create 21st century global learning environments (Gibson, 2002).

Background

The California Educational Technology Professionals Association (CETPA, 2011) is a non-profit association of Educational Technology Professionals (technologists) within the state

of California. Founded in 1960, the association's activities focus mainly on promoting the integration of administrative and educational technology within the state of California and preparing its members to better meet and support the technology needs of the classroom (California Educational Technology Professionals Association [CETPA], 2011). The Fiscal Crisis Management Assistance Team (FCMAT) was established in 1992 to serve the local educational agencies in California with a wide array of business needs. The services provided by FCMAT include California School Information Services (CSIS), professional development, software development, as well as support for community colleges and charter schools (Fiscal Crisis Management Assistance Team [FCMAT], n.d.).

In 2004, the executive board of CETPA, along with the FCMAT, performed a comparative analysis of the salaries of Chief Business Officials (CBOs) in California schools and determined that CBOs who participated in the FCMAT CBO training program earned approximately 15% higher salaries than non-participating CBOs. As a result of this analysis it was recommended that FCMAT develop a similar program for the technology leadership for K-12 school districts with two primary objectives: (a) to increase the pay of technology leaders, and, (b) to increase the professionalism of technology leaders to allow them to attain the highest level of leadership in the school district. Over the course of 18 months, CETPA convened a steering committee, including FCMAT representation, to develop the curriculum for the CTO Mentor Program (Scrivano & Bennett, 2013).

The intent of the CTO mentor training program is to produce qualified California school district CTOs. This program establishes high expectations for leaders in technology and forms a community of patronage through the mentoring relationship and collaboration between various cohorts. The program also endeavors to enlighten superintendents and district leaders of the

importance of a cabinet level CTO role. The curriculum for the CTO Mentor Program includes three essential strands—Leadership, Education, and Technology—and each strand has several subsets of topics (CETPA, 2011). The CTO steering committee reviews the curriculum annually for relevance and structures it to provide a rigorous study of all essential skills needed to be a successful CTO. Each candidate is partnered with a mentor who is currently employed in a K-12 school district or county office of education as an educational technology leader, with at least 10 years of working experience, and who has earned a degree in education or a related field in business, has a CTO certification, or has demonstrated work experience.

Modeled after FCMAT's highly regarded CBO Mentor Program, the goal of the CTO Mentor Program is to produce technology leaders qualified to improve teaching, learning, and educational administration for California's school districts and county offices of education. This program provides classroom training in eight sessions presented over the course of a weekend (Friday night and Saturday all day once per month for 8 months). The program is unique due to the pairing of each candidate with his or her own mentor to guide him or her through the curriculum. The mentors and instructors are experienced CTOs working in the K-12 environment. The instructors, mentors, and previous program graduates create a professional learning community for the candidates that continues far beyond the 8-month course. This support provided by mentors is designed to strengthen the skills of the technology leaders who, in turn, aim to enrich the educational experience of children in California.

Candidates are admitted to the program following the vetting of applications and the steering committee's recommendation for their participation. Criteria for acceptance include, but are not limited to the following: involvement in some aspect of school technology; teaching experience; experience in an educational setting; technology expertise; technology customer

service experience; budget experience; contract negotiation; communication skills, such as performing staff evaluations; school board presentations; and conference presentations. Once accepted, candidates are challenged to complete an instructional program designed to increase their understanding of topics that propel educational technology policies in key functional areas in the K-12 environment. Areas addressed in the curriculum include educational issues such as assessment and accountability, as well as K-12 budgeting and finance; the importance of strong, effective leadership focused on improving teaching, learning, and educational administration; and technology topics such as student systems, technology planning, and end user support. A curriculum that reflects current purpose and responsibilities required of a K-12 CTO has been adopted and continues to evolve each year so that it is relevant and current for each class.

Statement of Problem

The CTO Mentor Program has been in existence since 2007. During its existence, CETPA has engaged a steering committee that oversees the development of curriculum, choice of candidates, and certification of candidates, in addition to providing general counsel to the CETPA Executive Director (ED), who is the designated project manager of the CTO Mentor Program. Since the inception of the program, training has been provided to 161 graduates, 147 of whom have been certified by the CTO steering committee, with recommendations from the instructors and mentors. Although the collaboration between the steering committee and the ED has provided a fairly solid rudder guiding the course direction and learning outcomes, goals have been modified throughout the years without evidence to support the need for curriculum changes. Curriculum and instruction have been modified throughout the years based on the interests of the instructors and perceived trends in K-12 education. Candidates are surveyed after each class to determine the reaction to the class and the instructor, but currently the practice of evaluating the

efficacy of the instruction and whether the learning outcomes are transferable to the job are not measured. It is critical to the ongoing success of the CTO Mentor Program to determine the relevance and knowledge acquired during the program. As the sole financial backer of the CTO Mentor Program, CETPA must determine if there is an adequate return on investment (ROI) to justify the continuation of the program. To date no research has been conducted to assure that all adjustments to the curriculum made between 2007-2014 related directly to the skills required for the CTO position.

Purpose and Nature of the Study

The purpose of this mixed methods study was to identify the extent to which differences exist before and after candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations. A second purpose of this study was to identify the degree to which CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives. The third purpose of this study was to identify the degree to which CETPA CTO graduates perceive the program's learning activities and objectives are relevant to their on the job performance.

Research Questions

The following questions served to focus this study's research process:

1. To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations?
2. To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives?

3. To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance?

Theoretical Framework

This study was based on two theoretical frameworks: Malcolm Knowles's theory on adult learning and andragogy, and Donald Kirkpatrick's model for assessing training programs. Mentoring models and best practices were also explored as mentoring is a focal point of the CTO Mentor program.

Andragogy. CTO mentee candidates are adult learners who come from varied backgrounds and experiences. Many come from the classroom as former teachers, and many come from an IT background. Mentor candidates come into this program either as a condition of employment or of their own free will with the goals of becoming a certified CTO and advancing their careers in K-12 educational technology leadership. To better serve the candidates, an understanding of adult learning is necessary in order to present a program that meets the needs of the learners. Andragogy, Knowles' theory of adult learning, is based on six core principles:

- The learner's need to know,
- Self-concept of the learner,
- Prior experience of the learner,
- Readiness to learn,
- Orientation to learning, and
- Motivation to learn. (Knowles, Holton, & Swanson, 2005, p. 3)

These six principles are at the core of the andragogy model, surrounded by "individual and situational differences as well as goals and purposes for learning" (p. 149). Boshier (2006) noted

that adults typically "choose learning programs that are of relevance to themselves within the context of their lives and at a time relevant to their current needs" (p. 45).

Evaluating training programs. Donald Kirkpatrick's concept of the evaluation process is most compatible with the andragogical ideologies and is practical in its formulations (Knowles et al., 2005, p. 132). Kirkpatrick (1996) described "three specific reasons to evaluate training programs:

- To justify the existence and budget of the training program by showing how it contributes to the organization's objectives and goals
- To decide whether to continue or discontinue training program
- To gain information on how to improve future training programs" (p. 21).

The Kirkpatrick model consists of four levels: reaction, learning, behavior and results. When all steps are present, an effective assessment of a training program is possible. Level one gauges participants' reactions during the training process: what they like most or least and what feelings they have, positive or negative, toward the experience. Level two evaluates the learning that takes place through data gathering about the principles, facts, or techniques attained by the candidates through the course activities. Level three identifies the behavioral changes that happen as a result of the training through self-rating scales, observations, interviews, and questionnaires. The fourth level, results evaluation, gauges the overarching effectiveness of the training program in creating sustainable change in the trainee and his or her organization and its culture.

Nature of Intervention

The CTO Mentor Program exists to produce technology leaders qualified to improve teaching, learning, and educational administration for California's school districts and county

offices of education. Important to the design and implementation of a program for adults is a "foundational knowledge of adult learning, cultural differences, relationship building, power and interests, and technology" (Caffarella & Daffron, 2013, p. 75). During the 96 hours of the program's instructional time, CTO mentees explore their own learning styles, leadership skills, existing knowledge of technology, education, and leadership as it relates to educational technology leadership. Instructors deliver content and materials to candidates prior to the scheduled class time, allowing candidates time to reflect on prior experience and their readiness to learn, both of which are key to the adult learning process.

Candidates are responsible for completing the prerequisite work prior to attending the monthly class, including reading articles, performing surveys, evaluating local systems, gathering data, and reviewing other materials such as videos and websites. During instructional time, candidates work in collaborative groups, participate in learning activities, and engage in discussions, all of which facilitate the completion of the required artifacts and reflections required in the final portfolio. The time between classes is spent working with the mentor to complete the required assignments.

Each month mentors are required to spend 8-10 hours with their candidates. During this time, mentors dialogue with their candidates, either utilizing guiding questions (provided in the CTO Mentor Program manual) to lead the conversation, or using a free form dialogue based on the candidates' queries. Mentors keep a monthly communication log demonstrating work done with their candidates, which includes reviewing the completed assignments and providing honest and constructive feedback. Candidates are encouraged to provide comments to the mentors regarding the program and methods. Rubrics exist to evaluate the candidates' monthly

performance focusing on the mentor relationship, sharing work, portfolio development, business writing, oral communication, and class participation.

The final evaluation piece, which ultimately determines whether a candidate achieves CTO certification, is the portfolio he or she creates during the course of study. The portfolio has specific requirements including artifacts created for each learning outcome specified in the program manual; reflections accompanying said artifacts that explain the demonstrated mastery of the outcome; and finally, a program curriculum summary that covers all topics of curriculum, written in business language. This portfolio is evaluated by three certified CTOs using an established rubric prior to the candidate's final oral presentation. The intent of the final presentation is to assess the candidates' ability to present and executive summary consistent with potential school board presentations often required of the technology leader in a California K-12 school district.

Importance of the Study

This study is important as there is a need to assess the effectiveness, relevance, and transferability of the skills taught and ROI in the CTO Mentor Program for the consumers of the program as well as CETPA, the financial sponsor organization. Although the CTO Mentor Program curriculum is overseen by a steering committee and managed by the organization's ED, there has been no evaluation of the program save the level one survey completed at the end of each course section.

As Boshier (2006) noted, adults choose educational programs that are significant to them, relevant to their lives, and applicable to their current needs at the present. It is important to assess the relevance of the course of study to the adult learners in the program. While the relevance of the course is assessed cursorily (at Kirkpatrick's level one) at the conclusion of each class

session, there has been no follow-up upon evaluation of the certification program to assess the relevance of the program to the actual K-12 educational environment. This study gathered data from prior cohort candidates and from a non-CCTO (Certified Chief Technology Officer) control group to determine the relevance and transferability of skills to the workplace. Through the lens of Kirkpatrick's level two and three evaluations the researcher answered the questions of whether or not the candidate has learned the material intended to be taught and to what degree there was noticeable and measurable change in the activity and performance of the candidates when they had returned to their roles.

From a practical standpoint this study will provide important information to the sponsor organization, CETPA, by determining whether the benefits are significant enough to justify the ongoing cost of the CTO program. Currently CETPA invests approximately $40,000 annually to support the CTO Mentor Program while each student pays $1,600 in tuition as well as his or her own travel and hotel expenses. This study is important as its results could provide the rationale for further development or enhancement of the curriculum as well as support the importance of executive training programs focused on K-12 technology leadership in other states. As the CTO Mentor Program is loosely aligned to the CoSN Framework of Essential Skills for CTOs, this study could provide a rationale to develop a training program in preparation for the CETL (Certified Educational Technology Leaders) exam, which allows candidates to demonstrate a mastery of the information and competences needed to successfully create 21st century learning situations in a K-12 educational organization (Consortium for School Networking [CoSN], n.d.).

Research Assumptions

The following research assumptions were implicit in this study:

- Survey respondents would understand the instrument and answer inquiries honestly.

- Organizational data requests would be satisfied as well as requests for follow-up interviews, as needed, to gain clarity.
- The input received from the CTOs who responded would be reflective of those CTOs who went through the training program.
- This study applied only to the educational arena.

Limitations

This study was conducted with the following limitation; the results relate to the CEPTA program only and cannot be generalized to any other program.

Delimitations

It is important to note that the researcher currently holds the position of CTO for a K-12 public school district in California. It is also important to note that the researcher is a graduate of the CTO Mentor Program.

Operational Definitions

- Andragogy – The "art and science of helping adults learn" (Knowles, 1990, p. 43). This theory of adult learning is founded on the assumption that the adult learner needs to know why the learning is necessary, is responsible for his or her own learning, has amassed a volume of life experiences from which to draw, is intrinsically motivated to learn, is ready to learn the things he or she needs to know, and orients his or her learning toward task performance or problem solving relevant to real-life situations.
- Measurement and Evaluation – The process of improving training programs through evaluation planning, data collection, data analysis, and reporting. When done well, this process will reap key benefits for the sponsoring organization (P. Phillips, 2010).

- Mentor – Best described as a teacher, advisor, one who encourages and provides support. A mentor typically provides career and psychological support.
- Participation in CTO mentorship program – California school technologists who applied for and were accepted to undertake the 8-month course of study through CETPA.
- Perception – An impression, an attitude, or understanding that is formed based on what one observes or thinks (Merriam-Webster's Collegiate Dictionary, 1979).
- Effective technology leadership – The ability to lead an organization's use and procurement of relevant technology.
- Relevance – Applicability to the subject at hand; social relevance (Merriam-Webster's Collegiate Dictionary, 1979).
- Effectiveness – The ability to produce or be capable of producing a desired effect (Merriam-Webster's Collegiate Dictionary, 1979).
- Learning objectives – The identified outcomes for the successful completion of the CTO Mentor Program; defined as:
    - Exposure – The ability to understand general concept without necessarily relating it to anything else.
    - Familiarization – The ability to retain specific details about the topic.
    - Working Knowledge – The ability to recall the concept, process or technique without fully understanding how to use it; requires more detailed information.
    - Application – The ability to demonstrate the use of the concept, process, or technique (CETPA, 2013).

- Transferability – The influence of one performance or experience on a subsequent task (Ellis, 1965).
- Learning activities – Activities provided during the course delivery to facilitate learning.
- Job performance – Totality of a worker's execution of assigned tasks.

Key Terms

- CIO (Chief Information Officer) – Senior most IT professional in the public school district. The CIO is accountable for the district's information and technology systems and services (Maas, 2010)
- CTO (Chief Technology Officer) – Top-level district technology leader (Mitchell & White, 2008). This position can be synonymous with the CIO or may report to the CIO.
- CCTO (Certified Chief Technology Officer) – This title is awarded to the candidate who successfully completes the CTO Mentor program and achieves certification (California Educational Technology Professional Association [CETPA], n.d.b).
- CETPA (California Educational Technology Professional Association) – A non-profit corporation whose goals include promoting the integration of instructional and educational and administrative technology in K-12 school districts. It is also one of seven CoSN affiliates nationwide (CETPA, n.d.a, n.d.c).
- CoSN (Consortium for School Networking) – A national association for school CTOs. It is currently the only national organization that has attempted to define the role of the CIO in public schools (Maas, 2010).

Chapter Two: Literature Review

This chapter provides a review of the literature relevant to the evaluation of the CTO Mentor Program. The first section introduces the evolution in K-12 technology and technology leadership, including the roles and skills necessary for successful leadership. The next section discusses adult learning theory and mentoring, as these are two key components of the CTO Mentor Program. The final section examines the importance of evaluating training programs, focusing on Kirkpatrick's (1979) four levels of evaluation of training programs.

Evolution of Technology

In order to understand the evolution of the CTO position, one must understand the evolution of technology itself. During the 1950s, technology was driven by mainframe computer systems. Computers were physically massive and focused only on computational effectiveness. The technology was built on vacuum tubes and data were processed utilizing punch cards. Maintaining a mainframe required little to no leadership, just someone with technical skills to change the tapes and the hundreds of vacuum tubes. Computer room managers were charged with keeping the equipment rooms chilled and "keeping the monster mainframe running" (Moore, 2010, p. 2).

The 1960s and 1970s were a rapidly changing period in the evolution of the computer and technology use. Each year brought huge physical changes in the hardware, the development of new computer languages led to the creation of software, the concept of networking was introduced, and the transistor was created, ultimately replacing vacuum tubes (Computer History Museum [CHM], n.d.). While both hardware and software were rapidly developing, there were few changes in the way organizations used computers, and different departments would use the technology specifically for their needs. There was limited IT strategy at this point; it was only

used by progressive organizations that saw the need to understand how an organization would use the technology (Moore, 2010).

The 1980s brought another large technological change with the development of the microprocessor and the personal computer. Personal computers (PCs) were now affordable and software was developed that was graphical in nature and allowed for less technically trained people to use the technology (CHM, n.d.). Apple, Radio Shack, and many others quickly entered the PC market. The IBM PC was introduced in 1981 and "received rave reviews in the technical and commercial press" (Cline, 1986, p. 2), quickly becoming "the most sought after computer for office applications" (p. 3). The success of IBM, Apple, and other vendors of PCs resulted in rapid decreases in retail prices; for the first time, schools could now afford to purchase technology for educational use. This era of the PC was the bane of many IT professionals' existence as users began to develop personal technology skills. This period is known as the *Client-Server Era*; during this time, the structure of modern IT departments began to take shape. The IT leader was unable to focus solely on the operations, as there was an increasing expectation that technology projects should generate a ROI to the business. During this period, schools began investing in technology programs with the goal of improving student achievement (Moore, 2010).

During this period of time, public consensus centered on the need for substantial remedial efforts for the nation's schools (Cline, 1986). The public consensus stemmed from

> a plethora of critical commission, task force and study reports (Boyer, 1983; National Commission on Excellence in Education, 1983; Task force on Education for Economic Growth, 1983; Twentieth Century Fund Task Force on Federal Elementary and Secondary Education Policy, 1983). (Cline, 1986, p. 2)

which criticized the extremely low levels of academic excellence in U.S. schools. The special commission on Pre-College Science and Mathematics Instruction issued a report in late 1982

suggesting that "science education in the United States was grossly inferior to that of other countries" (p. 2) and included recommendations to the National Science Foundation (NSF) to create a series of programs to remedy the situation (Cline, 1986).

In an attempt to increase private/public collaborations to improve education and at the urging of Steve Jobs (CEO of Apple), California Democrat Peter Stark introduced the *Computer Equipment Contribution Act of 1982* (Cline, 1986). This bill was passed by the House on September 22, 1982 but was never passed by the Senate (Library of Congress, n.d.). When the bill failed to pass, "Apple pursued the matter in the California legislature, and was successful in getting state corporate tax reductions for donations to California schools" (Cline, 1986, p. 3). Jobs began the *Kids Can't Wait* program, through which Apple distributed an Apple IIe PC to any California school that requested one (CHM, n.d.; Cline, 1986).

IBM retained representatives from outside agencies, including Educational Testing Services (ETS), looking for advice on computer education programs needed in America's schools. ETS urged IBM to create a program that was built upon and expanded on earlier private/public partnerships with education. IBM initiated an eight million dollar computer education program in the spring of 1983 with the purpose of developing and refining a model for effective computer use in secondary schools (Cline, 1986). This pilot program existed in three states: California, Florida, and New York. These three states were chosen because the aggregate number of students "represented almost 20% of the secondary school student population" (p. 4) in the nation, and IBM had sizable operations in each of these states. *The Electronic Schoolhouse: The IBM Secondary School Computer Education Program* donated the following to each participating school: "15 IBM PCs and extensive sets of software for word processing, database management, graphics, spreadsheets, tutorials, learning games, and programming

languages" (p. 1). Included in this project was *layered training*, a straightforward concept that included three layers of training. The first layer had ETS staff training two people from each Teacher Training Institute (TTI) located in the same cities as the 98 pilot schools. In the second layer, TTI staff trained several teachers at each of the pilot schools. The third layer had the trained teachers training remaining teachers on their staff as well as the students (Cline, 1996). IBM began a second program in the summer of 1984 "conducting an intensive computer education institute in Sydney, Australia" (p. 141). These programs, "with their emphasis on the computer as a tool and on teacher training, network support, and telecommunications had a major influence on the introduction of computers into schools" (p. 142). This decade was a transformative time for educational technology as new software, hardware, policies, and organizations were created with the intention of advancing learning (Billings, 2008).

The 1990s-2000 was known as the Internet Era as the World Wide Web was conceived and developed during this time:

> The World Wide Web was born when Tim Berners-Lee, a researcher at CERN, the high-energy physics laboratory in Geneva, developed Hyper Text Markup Language. HTML, as it is commonly known, allowed the Internet to expand into the World Wide Web, using specifications he developed such as URL (Uniform Resource Locator) and HTTP (Hyper Text Transfer Protocol). An internet browser, such as Netscape or Microsoft Internet Explorer, follows links and sends a query to a server, allowing a user to view a site. (CHM, n.d., p. 9)

Technology transformation in American education began in earnest with the creation of the Internet, which allowed "students to learn outside of the regular classroom, expand educational opportunities for rural and other isolated students, and allow educators to communicate with colleagues around the world" (Cate, 1994, p. 6).

President Clinton created the National Information Infrastructure Advisory Council (NIIAC) in 1993 and appointed Vice-President Gore as its chair. The focus of this council was

"to create a national network on telecommunications service" (Cate, 1994, p. 19). The council recommended in its final report that a national goal be set "to deploy Information Superhighway access and service capabilities to all community-based institutions that serve the public, such as schools and libraries, by the year 2000" (National Information Infrastructure Advisory Council [NIIAC], 1995, p. 10). Within 1 year Congress had passed the Telecommunications Act of 1996 that created the E-Rate program (Cate, 1994), which began officially in 1998, providing up to $2.25 billion annually to schools and libraries through Internet and communications technology subsidies. The funding for this program was provided via "a tax on long-distance services as a new, information-age component of the Universal Service Fund" (Goolsbe & Guryan, 2006, p. 336). The Federal E-Rate program increased access to the internet through improved bandwidth to schools and brought with it new challenges for IT leaders as users wanted more speed, faster computing, and 24/7 access to resources (Moore, 2010). The Federal E-Rate program, more specifically the *universal service section* (Section 254), was designed to help schools and libraries in access state of the art services and technologies at reduced rates (Federal Communications Commission, 2004; Goldmann, 2011). Access to the Internet in public schools increased dramatically from 8% in 1995 to 98% in 2008 (U.S. Department of Education, National Center for Education Statistics, 2010).

In 2001, the *Elementary and Secondary Act* (ESEA) was reauthorized as the *No Child Left Behind Act.* Funding for technology through the No Child Left Behind Act led to the infusion of classroom technology with the objective of raising student test scores. Enhancing Education Through Technology (EETT) grants were awarded competitively from 2002 until 2010, utilizing data through a funding formula based on free and reduced lunch numbers. The EETT grants were used to fill the chosen schools with new hardware and software, presumably

determined by the school districts' educational technology plans (Berstein Strategy Group, 2011; Goldmann, 2011).

Currently, technology is making another large design shift to the *cloud*, also known as virtual computing. By the year 2020, technology will no longer reside at the physical location of the organization, but will be hosted on servers in remote locations (Moore, 2010). This shift to software as a service is currently happening in organizations and is changing the structure of IT departments, reducing the size of IT staff. The challenge for technology advocates requires a move from being a "technology mechanic or leaders of technology mechanics, to having a seat at the executive table" (Chester, 2006, p. 56).

Evolution of the Technology Leadership

Technology leadership has evolved through the years in keeping with the evolution of both hardware and software. The role of the business technology leader originated from the early days of data processing (Lane, 2004). The position was not so much a leader or manager as much as it was that of a technician. The field of technology was so highly specialized in the 1950s through the 1970s that the only group who understood the processes was trained technical staff. The CTO role first appeared in corporations in the 1980s due to a need for accountability and an understanding of the needs of the organization's use of technology (Boettcher, 2007). Leadership positions in higher education (colleges and junior colleges) also included the CTO in the 1980s. As technology began to permeate higher education, many colleges acknowledged the need for some type of global leadership and selected a CTO to lead the implementation process (Becker, 1999). Penrod, Dolence, and Douglas's (as cited in Brown, 2006) survey conducted in 1990 identified 200 CTOs in higher education; by the year 2000 there were over 1,300 CTOs in higher

education. Explosion of growth in the number of CTOs was aligned with the rapid growth of technology during the same time (Boettcher, 2007).

The rationale for this large increase in the number of CTOs in corporations and higher education can be explained not just by the additional technology that resides on campus, but also by the change in the overarching role that technology plays in education.

> Today, information technology is inextricably woven throughout the fabric of higher education and has assumed a strategic role in the fulfillment of the campus mission. It is thus imperative that campus IT decisions involve not only the chief technology administrator but also the president or chancellor and his or her leadership team (Ward & Hawkins, 2003, p. 39)

Technology leadership roles. Requirements for modernization and efficacy have led to expanded technology leadership roles, creating a complex mix of management and leadership to "attain a balance between innovation and stability, effectiveness and efficiency in their organization" (McLean & Smits, 2012, p. 1). McLean and Smits (2012) identified four roles in their model of technology leadership: technologist, enabler, innovator and strategist. Balance must exist among the four roles; however, the skills need not be acquired in order. The authors asserted that, looking to the future, the challenge for CTOs will be in two roles: primarily innovator and strategist (McLean & Smits, 2012). Educational technology leaders have a unique role in a school district that is often more focused and demanding than that of rudimentary organizational management, requiring an understanding and modeling of effective leadership philosophies (Courville, 2011). Courville (2011) also included a working knowledge of technology, the educational arena, and the classroom structure as qualifications for effective technology leadership within a school district.

In 1996, Computer Sciences Corporation suggested six new information science (IS) leadership roles that were essential to achieve information technology's (IT's) future (Gottschalk, 2000):

- Chief architect – designs future possibilities for the business.
- Change leader – orchestrates resources to achieve optimum implementation.
- Product developer – helps define the company's place in the emerging digital economy.
- Technology provocateur – embeds IT into the business strategy.
- Coach – teaches people to acquire the skill set needed for the future.
- Chief operating strategist – invents the future with senior management. (p. 32)

Fisher (2000) further stated that "A successful CTO must embrace the job's traditional duties as operations manager as well as the critical role of corporate strategist" (p. 38). Some organizations are circumventing the CTO station altogether and hiring a CIO to manage both the strategic and operations oriented tasks related to e-business (Fisher, 2000). In 2004, King argued that the role of IT and today's CTO is that of a *change agent*, reflecting a change in roles from *technology mechanics* or leaders of technology mechanics to being CTO leaders (Chester, 2006). Instead of technology projects (installation of specific hardware and infrastructure) teaching projects, or projects that apply campus wide, enhance shared communication and to create effectiveness.

As an educational technology leader in a school district setting, a K-12 CTO's responsibilities involve much more than technology, and technology is no longer a means unto itself (Mitchell & White, 2008). The more essential technology is to an organization the more imperative it is that the CTO have a significant impact on the organization's approach. This shift

places the CTO in a position to extend guidance through his or her *techpertise* (Medcof, 2008). Medcof (2008) also stated that "in most firms the CTO sits on the executive committee with the CEO, CFO, and other top executives and has an important role to play in leading the innovation of the organization" (p. 408). Each school district needs employees who are experts in networking and systems infrastructure, technology integration into curriculum, and all other aspects of technology, but the cabinet level CTO does not have to be the one with all of the knowledge (CoSN CTO Council, 2006). Instead, the "primary functions of the CTO role include involvement in organizational strategic planning, information systems planning, leading information policy development, managing information resources, and overseeing new system development" (Weiss, 2010, p. 18).

Technology leadership traits. Many studies have been conducted and much literature has been written on the general subject of leadership. In spite of the many ways leadership has been conceived, the following elements can be recognized as central to the subject: "Leadership is a process; leadership involves influence; leadership occurs in groups; and leadership involves common goals" (Northouse, 2010). Kotter (1990) stated that "effective leadership produces useful change" (p. 103), whereas "more change always demands more leadership" (p. 104). Resultant from survey data collected and analyzed at the Cutter Consortium since 2001, seven habits were clearly identified that 21st century technology leaders practice each day. The list includes both processes and outcomes; "business technology leaders build business scenarios; track technology that matters to business; identify business pain and pleasure; organize adaptively; manage infrastructure cost-effectively; communicate well and often; and market" (Andriole, 2007, pp. 68-71).

It is important that the CTO keep in mind the key job of education – teaching and learning: a *leader as servant* perspective (CoSN CTO Council, 2004). Servant leadership stresses that leaders should be attending to the concerns of their followers and should empathize with them; they should take care of them and cultivate them (Northouse, 2010). Hall (2008) described three types of leadership archetypes in technology leadership: Sage, Sensei, and Oracle. The Sage focuses on processes and policy, accomplishing and assigning critical tasks. The Sage is often perceived as ego driven, decisive and directive, and enjoys being recognized. The Sensei focuses on balanced approaches (strategic and tactical), building capacity and coaching or modeling. The Sensei is often perceived as an engaging, pragmatic facilitator who enjoys seeing the staff being recognized for their efforts. The third archetype is the Oracle: philosophical and conceptual, a cultural change agent, strong with building relationships (internal and external). Oracles are often perceived as indecisive due to the fact that they only give advice and can appear to be disconnected since they delegate all duties and responsibilities.

A CTO performs a vital role in district-wide planning and goal setting. In this situation, a valuable CTO is one who is comfortable functioning as both a change agent and a consensus builder (CoSN CTO Council, 2004). Leaders will enhance their efficacy if they are constantly working on the five components of leadership with energy, enthusiasm, and hope: if they pursue moral purpose, understand the change process, develop relationships, foster knowledge building and sharing, and strive for coherence (Fullan & Ballew, 2004). A CTO in K-12 education must be a capable administrator, an experienced educator, an effective communicator, and a technologically savvy person who can work with all district staff at all levels in the district (CoSN CTO Council, 2004).

Technology leadership effectiveness. Potentially, the benefits of effective technology leadership include providing greater efficiency in administrative operations, which can lead to students' improved academic performance and growth, improved attendance rates, reduced attrition rates, and modernized Career Technical Education (CTE) preparation of students (Kearsley & Lynch, 1992).

CTO characteristics are absolutely related to their effectiveness, based on the notion that a CTO must possess basic qualities in order to be considered effective (Brown, 2006). Effective CTOs exhibit significant personal skills and behaviors that stand out against all others (CoSN CTO Council, 2009):

- Communicator – direct, honest, and respectful in all forms.
- Exhibits courage.
- Flexible and adaptable as well as credible.
- Results-oriented in both organizational improvement and personal growth.
- Innovator – leading for innovation and modeling behaviors others are encouraged to adopt.

In his dissertation, *A study of Chief Information Officer Effectiveness in Higher Education* (Brown, 2004) "found a correlation between the CTO's strategic business knowledge, interpersonal skills, and political savvy and IT knowledge" (p. 105) and his or her perceived effectiveness. To be most effective, "CTO's will be able to shift their time from distracting operational issues to education leadership and transformation by driving technology solutions that help all aspects of the district's education and support operations" (Moore, 2010, p. 6).

Technology leadership: Essential skills identified. For a CTO to successfully implement his or her role in the organization, he or she must possess the skills to perform his or

her duties. This is an area of much discussion and increasing study. Elite CTO skills, as identified by Katinka Nicou (2006), include: the capacity to plan and execute successfully integrated IT initiatives,; relationship building and motivational skills, strong visionary and inspirational leadership capabilities, the ability to recognize cause and effect of actions and behaviors, both the individual and organizational levels, highly developed cultural sensitivity, and the ability to perceive and read the environment and act appropriately. EDUCAUSE's Brian Hawkins (as cited in Bucher, Horgan, Moberg, Paterson, & Todd, 2001) stated that a CTO needs three primary skills: communications, alliance building, and collaboration. More specifically a CTO needs to:

- Establish friendly relationships with stakeholders and get familiar with the staff;
- Understand the tech staff and reorganize the department as necessary, but judiciously.
- Learn the culture of the institution; learn about the budget structure of the institution.
- Build a relationship with the boss after you get to know who the boss is.
- Set and manage expectations – yours and the institutions.

It is the CTO's responsibility to know the best practices in the field and maintain a network of colleagues who can provide feedback on what has worked and what hasn't (Floyd & Murali, 2010). "With increased visibility and importance being given to the CTO position, there has also come a corresponding increase in new job responsibilities and accountabilities" (Beatty et al., 2015, p. 2). CoSN's K-12 CTO Council, which is responsible for overseeing professional development for key technology leaders at the school district level, recognized nine essential skills necessary to the job of a district CTO. In the course of its leadership forum series attended by technology leaders from districts throughout the United States and after much dialogue, CoSN

offered the following *best practices* that were identified by the council and that correlate to the nine essential skills (CoSN CTO Council, 2005).

- Leadership and Vision: Focus the technology plan on the strategic plan of the District; assess the needs through research and evaluate progress.
- Planning and Budgeting: Eliminate specific uses of technology if they do not yield results; be cognizant of the Total Cost of Ownership (TCO).
- Team Building and Staffing: Communicate regularly and keep constituents informed; base staff member's evaluation on the level of customer support they provide.
- Systems Management: Standardize and centralize technology purchases.
- Information Management: Utilize data to drive instruction and identify interventions.
- Business Leadership: Be clear in defining specifications when issuing requests for proposals; be clear in the criteria for evaluation.
- Education and Training: Survey staff with a needs assessment to determine relevant course offerings; provide options for professional development – online, face-to-face or both.
- Ethics and Policies: Develop policies for data security; communicate policy information clearly.
- Communication Systems: Develop interoperability between your data systems; Allow parents to use "self-serve" systems to update the student information.

The CoSN Framework of Essential skills identifies three basic strands of essential skills, with 10 sub-strands and a total of 81 discrete skills (CoSN CTO Council, 2009). The three basic strands include:

- Leadership and Vision – Leadership and Vision, Strategic Planning, Ethics and Policies.
- Understanding Educational Environment – Instructional focus and Professional Development, Team building and staffing, Stakeholder focus.
- Managing technology and support services – IT, Communication Systems, Business Management, Data management.

Maas (2010) conducted a national study of essential CTO skills based on the CoSN Framework of Essential skills and reported the following findings:

- A clear message that the CTO must have the skills necessary to effectively create, support, monitor teams of staff with diverse expertise.
- The CTO must have a solid understanding of instruction and also provide for meaningful professional development.
- The most important skills a CTO must have include leadership, vision, goal setting, planning, and financial management.

IT leaders must learn to understand the complex financial planning of their institutions. They must clearly understand the organization's processes and financial structure, as well as its sources of funding and *strings* attached, as in the case of federal funding (Goldstein, 2007). Carol Cartwright (2002), President of Kent State University, seeks in a CTO the same skills she valued in all executive officers: proven leadership skills, strong management skills, and a solid understanding of the difference between the two.

Training Programs for Aspiring Technology Leaders

Professional development in educational organizations is primarily focused on developing teacher skills with a focus on increasing student achievement (Desimone, 2011;

Guskey, 2002). Thousands of articles and books have attempted to identify the attributes of a successful professional development program. Educational organizations consist of leadership positions such as CBO, CTO, Human Resource Officer (HRO), and budget and finance personnel who require specialized training to learn the skills needed to perform their specific tasks. California's Fiscal Crisis Management Assistance Team designed the CBO Mentor program "to produce qualified District CBO's" (Fiscal Crisis Management Assistance Team, n.d., p. 1). The Association of California School Administrators (ACSA) has developed "job specific academies to provide a solid foundation of training in the application of management fundamentals for new or aspiring administrators" few (Association of California School Administrators [ACSA], n.d., p. academies) The ACSA academies are perceived to be the "fast track into the career of Superintendent, principal, business manager, and personnel administrators," among other key leadership positions (Association of California School Administrators [ACSA], n.d., p. academies).

Executive training programs typically fall into three categories: university, corporate, or commercial (Chenault, 1987). Chenault (1987) specified that university training programs require a specific sequence of courses that are applied to whatever career path a student may choose, but are not typically geared to a specific position or role. Corporate and commercial training programs generally offer non-sequential seminars that are designed to train employees in particular tasks.

Corporate University (CU) programs vary in scope from training departments to post-secondary degree offerings (Allen, 2002). In *The Corporate University Handbook (2002)*, Allen offered the following definition of CUs: "A corporate university is an educational entity that is a strategic tool designed to assist its parent organization in achieving its mission by conducting

activities that cultivate both individual and organizational learning, knowledge, and wisdom" (p. 12). Allen identified four levels of activities typically employed by CUs: "training only; training plus managerial and/or executive development; courses offered for academic credit; and courses offered that lead to an academic degree" (p. 5). The author stated that "an organization should at least conduct management and executive development (in addition to training) to qualify as a corporate university" (p. 8). He asserted that the best CUs are those that exist to meet the organization's goals, typically identified in their mission and vision statements.

Chenault (1987) suggested that there is a "missing option" in executive training programs, which he defined as "a thoughtfully designed, long-term, integrated, continuing learning progress" (p. 50). The characteristics of the missing option include:

- A program developed collaboratively by participants, trainers, and organization;
- With individualized learning goals;
- In adult, learner-centered, self-directed study;
- Assisted by mentors;
- Who deal with connected, integrated content over a long period of time (1-2 years).

Employees engage in training to grow skill sets, maintain their competitive edge, or fill gaps in their knowledge or to meet the organization's changing needs (Lewis, 2002). Organizations must realize that people are an asset, and people with the right skills provide a competitive advantage. As a result, executive (corporate) learning programs are swiftly becoming the *connective tissue* of many organizations (Fulmer, 2002).

Adult Learning Theory

Corporate, executive, and collegiate training models all have one important factor in common: adult learners. Throughout history, adults have had the need to learn new skills driven

by the social context in which they lived (Merriam, Caffarella, & Baumgartner, 2007). The roots of adult learning stem from the teaching methods and principles employed by the philosophers Aristotle, Plato, and Socrates, whose students were adults seeking insight to handle their societal roles and individuality (Forrest & Peterson, 2006). Early settlers learned to read so they could study the Bible, the Industrial Revolution brought a need for adults to have *industry-based* skills, and the "influx of immigrants to the United States brought the Americanization and citizenship programs" that became a prominent form of adult education (Merriam et al., 2007, p. 6).

The question of how adults learn has been the focus of innumerable studies since the 1920s. Still, after over 90 years of research, "there is no single answer, no one theory or model of adult learning that explains all there is to know about adult learners, the various contexts where learning takes place and the process of learning itself" (Merriam, 2001, p. 3). Although the formal study of adult learning and education is fairly new, the basic principles from which they were born are not (Conaway, 2009).

Conceived in 1833 by German Alexander Kapp and brought to America in 1927 by philosophers Eduard Lindeman and Martha Anderson, the term *andragogy* was introduced to better explain adult learning (Conaway, 2009). The use of the term and the interest in adult education waned for the next few decades due to World War II. However, the need for vocational training became vital to support the war effort, and increased political and economic pressure brought the problem of providing adequate and appropriate adult education to the surface (Pattison, 1999). The humanism and progressivism movement of the 1950s offered an opportunity for adult educational change. Humanism focused on the achievement and growth of the whole person in terms of distinctiveness and individuality. The progressives' principles

focused on being learner centered, the teacher serving as a facilitator, and social activism, placing "education at the heart of social reform" (p. 3).

Malcolm Knowles was a leading scholar-practitioner of adult learning in the United States during the 1950s-1980s. Drawing from humanistic and progressive principles, Malcolm Knowles began to build the foundation for his andragogy concepts by promoting student-centeredness and recognizing the needs of students (Conaway, 2009); he honed this foundation through his work at the National Youth Administration (NYA) and the Young Men's Christian Association (YMCA), as well as his graduate work at the University of Chicago (Knowles, 1989). Although he is not credited with coining the term, Knowles (1984) officially reintroduced and adopted the term andragogy in 1968 when adult educators were searching for a theory to call their own (Feuer & Geber, 1988; Lee, 1998). Knowles (1990) defined his theory as a "comprehensive, coherent, and internally consistent system of ideas about a set of phenomena" (p. 5), but ultimately came to the conclusion that "andragogy is the art and science of helping adults learn" (Knowles, 1984, p. 6).

The andragogical model is based on several assumptions that distinguish adults from children (Knowles et al., 2005):

- Adults have a need to be responsible for their own decision, for their own lives;
- Adults bring prior knowledge and experiences in greater volume than children;
- Adults come ready to learn what they perceive will help in their "real-life" situations;
- Adults are task-centered, life-centered, or problem centered – whatever will help them perform tasks or deal with real-life problems;

- Adults are responsive to external motivation (new/better job, higher pay, etc.) but respond to intrinsic motivation (self-esteem, quality of life, job satisfaction) more potently. (pp. 64-69)

Based on these assumptions, Knowles suggested a planning model for the design, implementation, and evaluation of educational experiences with adults (Merriam, 2001). In his *Designs for Adult Learning* (1995), Knowles described the andragogical model as a process design consisting of eight components. In preparing the learners for the program (a), one must set the climate, and (b) trainers should create an environment (physical and psychological) that facilitates learning. It is important to (c) involve learners in mutual planning of the course design or learning activities. Also essential to keep in mind is the importance of involving the learners in (d) diagnosing their learning needs, (e) learning objectives, and (f) learning plans. Knowles recommended the administration of self-assessments to determine the gap between skills possessed and skills, as well as contracts for learning that (g) identify resources to help meet objectives and help learners carry out their learning plans. Lastly, it is important to (g) involve leaners in evaluating the learning.

The two decades spanning 1970-1990 "witnessed much writing, debate, and discussion about the validity of andragogy as a theory of adult learning" (Merriam, 2001, p. 5). Although many adult educators fervently supported Knowles's theory of andragogy, equal numbers of critics thought that the andragogical assumptions were just as applicable to children's learning. Cyril Houle, a professor at the University of Chicago at the time Knowles was a graduate student, conducted research in 1960 to study how people who choose to participate in regular learning actually go about learning. He asserted that the assumptions in Knowles's theory about adult learners would never support a coalesced theory due to adults and children basically

learning the same way (Feuer & Geber, 1988). Hartree (1984) was unclear as to whether or not Knowles presented a theory of learning or a theory of teaching, whether adults learned differently from children, and whether a discrete theory actually existed, or was Knowles was simply describing principles of good practice.

Andragogy has been the foremost paradigm of adult learning for more than 40 years, yet little empirical research has been conducted to vet the legitimacy of its assumptions or its ability to predict adult learning behavior. Of the studies that have been conducted, several have focused on the assumptions of the andragogical model and instruction (Merriam et al., 2007). Beder and Darkenwald (1982) found that teachers viewed adults differently and used more andragogical techniques in their teaching. Gorham (1985) found that teachers who taught both adults and pre-adults (high school students) treated both groups the same way, although the teachers felt like they treated the two groups differently. Rachal (2002) focused his query on a review of 18 andragogical studies conducted between 1984 and 2001. All of the studies reviewed attempted to measure the effectiveness of andragogy versus pedagogy from the perspective of instructional design. Pedagogy is specifically an instructional theory, commonly known as the art and science of teaching. The author suggested that the issue at hand is the lack of an operational definition, thereby allowing the art of andragogy to dominate the science. Rachal offered seven criteria to future researchers of andragogy:

- The researcher should examine learning situations where the adult learner wants to be there (not forced), are motivated to learn due to intrinsic motivators, tend to perceive the learning activities as useful and not just functioning as a means to the end.
- The researcher should study adult "learners who have assumed the social and culturally-defined roles characteristic of adulthood" (p. 220).

- The researcher should examine learning situations where the learner collaboratively determines the learning objectives.
- The researcher must examine achievement that is mutually agreed upon by the learner and the facilitator.
- The researcher must measure the learners' satisfaction of the program.
- The researcher should make every effort to ensure that the physical and psychological environments are as compatible as possible with Knowlesian parameters for adult learning settings.
- The researcher should be aware of the technical issues surrounding the research: assignment of participants (random is preferable), number of facilitators conducting the learning treatments, adequate numbers of participants, informed consent, comparability of groups, and so on.

Merriam et al. (2007) asserted that the quality of andragogy, based on assumptions for adult learners, is difficult to validate directly. Despite some forbidding predictions of the death of andragogy, educators continue to find Knowles's theory and characteristics of adult learners to be a helpful measure for better understanding adults as learners (Lee, 1998).

Mentoring – Background Information

Many definitions exist for mentoring, and one of the criticisms in the mentoring literature is the inconsistency of the use of the term. The term mentor can be traced back to Greek mythology in Homer's *Odyssey,* where Odysseus asks his trusted advisor, Mentor, to care for and educate his son while he is away fighting the Trojan War (Stone, 2004). The character's name evolved into a general term used to describe a trusted individual (Bicego, 2006). Mentoring can be defined as the overseeing of the development of another and providing wise guidance to the

protégé. The business sector has a tendency to frame the definition in terms of career advancement, whereas the educational arena focuses more on the personal growth and learning aspects of mentoring (Davis, 2005).

Mentoring supports a great deal of what is known about adult learning, such as the importance of situational learning and interpersonal relationships (Buck, 2004; Chinnasamy, 2013). Mentoring paradigms have shifted away from the traditional model based on the authoritarian teacher instructing the dependent student, who is expected to receive and absorb knowledge, toward a collaborative, learning-centered paradigm (Zachary, 2012). The learning centered paradigm has seven critical elements: reciprocity, learning, relationships, partnerships, collaboration, mutually defined goals, and development. This paradigm shift in mentoring practice aligns with the basic principles of adult learning presented by Malcolm Knowles. However, research over the past three decades has opened new areas of understanding of the complexities of adult learning, and new theories inform the adult learning practice today, as well as the mentoring process. "The mentor of adult learners is not so much interested in fixing the road, as in helping the protégé become a competent traveler" (Daloz, 1999, p. xi).

Three theories of learning are specifically relevant to the mentoring process: emotional intelligence, self-directed learning, and transformational learning (Miloff & Zachary, 2012). Emotional intelligence is the ability to be self-aware and manage one's own emotions, to be aware of others and able to read mentees' emotions, and to be able to manage mentoring relationships (Golman, 2006). Self-Directed Learning (SDL), popularized by Knowles, is used to describe how adults take initiative and use resources to further their own learning efforts. Ultimately, mentees must accept responsibility for their own learning. Transformational learning is about becoming open to possibilities and perspectives by reflecting critically on one's lived

experience. Transformational learning generates new insights and signals a change in how one sees and makes sense of the world, bringing about more aligned, sustainable, and synergistic behavioral patterns and action (Mezirow, 1990).

Mentorship and organizational learning process. CETPA offers professional development with the goal of keeping the membership informed about best practices, lessons learned, and relevant resources. The CTO Mentor training program strives to produce qualified California school district CTOs by raising the bar for technology leaders and "creating a community of support through mentorship and collaboration" (CETPA, n.d.d, p.1).

This "community of support" (CETPA, n.d.d, p. 1) exemplifies a learning organization as defined by Senge (1990):

> An organization where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together. (p. 3)

Mentoring as an organizational learning process can provide the support system for changes that lead to real improvement (Buck, 2004). Each CTO mentor candidate is paired with a CTO mentor, an experienced leader in K-12 technology who currently holds a leadership position in K-12 technology. The mentor is chosen specifically to meet the candidate's learning and work style, often including a similarity in organization type. This pairing demonstrates a needed partnership between an educational organization and an associated network (Onnismaa, 2008).

Learning-focused relationships (Zachary, 2012) are at the core of mentoring, as they provide a powerful growth experience, a process of engagement, and reflective practice. These relationships begin with a shared vision and the identification of underlying assumptions and beliefs (Lipton & Wellman, 2003). The goals of a collaborative, growth-oriented, learning-focused relationships are based on the following assumptions:

- Induction to the program is an investment in the retention, integration and continual growth for the organization;
- Emotional safety is provided to ensure cognitive complexity;
- Mentoring relationships offer an opportunity for reciprocal growth and learning between mentor and mentee;
- The central goal for the mentoring program is improved student learning. (p. x)

There are four benefits to employing a learning-focused mentoring program: improving instructional performance; transferring policy, procedures, and educational and leadership philosophy; framing the professional learning journey; and promoting norms of learning and collaboration.

Unsurprisingly, mentors and mentees bring varying levels of practice and competence to the relationship. The competence model provides an understanding of the learning levels by dividing them into four stages: (a) unconsciously incompetent, (b) consciously incompetent, (c) consciously competent, and (d) unconsciously competent (Zachary, 2012).

Table 1

Four Levels of Learning in the Competency Model

Level	Description
Level One: Unconscious Incompetence	"We don't know what we don't know" Often results in an over confident mentee
Level Two: Conscious Incompetence	Becoming aware of our lack of understanding or knowledge
Level Three: Conscious Competence	Being aware of knowledge gaps with identified strategies for practice
Level Four: Unconscious Competence	Using acquired skills and knowledge habitually, as if they are second nature

Note. Adapted from *The Mentor's Guide: Facilitating Effective Learning Relationships* (p. 13), by L. J. Zachary, 2012, San Francisco, CA: Jossey-Bass. Copyright 2012 by the author.

Daloz (1999) equated mentoring to a transformational journey. The journey metaphor is consistent with his theory that the mentor is a "trusted guide rather than a tour director" (p. xi).

A mentor emerges near the commencement of the journey as a helper, preparing the mentee for what is to come. According to Daloz, the mentor should be focused on the transmission of wisdom by engendering trust, creating challenges, providing encouragement, and facilitating a professional vision.

Mentors engender trust by offering emotional, physical, instructional, and institutional support (Daloz, 1999). They accomplish this by attending fully to the mentee, responding empathetically, creating a safe space, reviewing schedules, offering resources, and providing information. Mentors create goal driven, data focused, and thought provoking challenges to facilitate growth and learning. Mentors can use the following techniques to challenge their protégés: structuring demanding examination and analysis of practices, engaging in goal setting, and actively engaging mentees in problem solving and decision making by brainstorming options and generating solutions. The mentor facilitates professional vision through setting high, yet attainable, expectations for the mentee, developing action plans, and modeling a professional identity that exemplifies the best one knows how to be.

The mentoring process. Skilled mentors support mentees in learning by sharing their experiences and helping mentees calibrate future action with emerging insight. The most essential function mentors can perform is to adopt a growth orientation, understanding that their task is to increase their colleagues' efficacy as professional problem solvers and decision makers (Lipton & Wellman, 2003). Mentors facilitate learning by maintaining focus on the learning through reflective inquiry (asking questions that require thoughtful answers), paraphrasing statements, summarizing the content discussed with the mentee, and listening (Zachary, 2012). Listening involves listening for silences, which may indicate confusion or discomfort, and listening reflectively (allowing for a focus on non-verbal responses). When mentoring, it is best

to not give the solution to the mentee, but to coach him or her on the process of problem solving and coming to the best answer through positive inquiry (Alexander, 2002). Mentors must possess competencies in understanding themselves and others, effective communication, and developing employee's skills (Govender & Parumasur, 2010). Mentors play a strategic role in building the soft skills of leaders that can't be learned fully via classroom instruction or textbook learning (Miloff & Zachary, 2012). "These soft skills include reflection on business experiences and relationships, setting stretch goals, trying new behaviors, and gaining and integrating feedback" (p. 102). Miloff and Zachary (2012) offered seven steps mentors can take to help the evolving leaders ():

1. Mentors can hold up a mirror and help mentees analyze their decision making patterns as well as help them understand their strengths and weaknesses;
2. Mentors help mentees gain exposure to a broad range of perspectives through readings, talking to experts, and extracting lessons from their personal experiences;
3. Mentors help leaders to focus on central, or lynchpin issues, in lieu of the secondary or easy issues;
4. Mentors help leaders understand and build relationships;
5. Mentors help leaders "insert themselves earlier into discussions and strategic decisions with well thought out insights" (p. 104);
6. Mentors help leaders build their networks, profile, and bond with other leaders in the field through discussions highlighting the mentees strengths;
7. Mentors collaborate with leaders in the design and implementation of their personalized professional development plan (pp. 103-105).

Predictable phases of mentoring. The knowledge that mentoring relationships have a predictable structure is often comforting to new and experienced mentors (Zachary, 2012). Although the phases of mentoring may be predictable, they do not traverse a linear path; rather, they are more likely to progress in a cycle, moving from one phase to the next based on observed behavior. Zachary (2012) identified the four phases of mentoring: preparing, negotiating, enabling growth, and coming to closure.

The preparation phase is the discovery phase of the relationship. Mentors and mentees must take the time to understand their motivation for engaging in the mentoring relationship (Zachary, 2012). Mentors must develop a *mentor's mindset* (Maxwell, 2008) and think like a mentor by making people's development their top priority. Great leaders understand the importance of relationships when it comes to success. If personal relationships are not developed first, people will not travel far together (Kotter, 1996; Maxwell, 2008; Zachary, 2012).

The second phase of mentoring is negotiating, or establishing agreements. In this phase, role assumptions are clarified, eliminating ambiguity on the expectations and assumptions of the mentor role. In this case, the term *role* refers to the assumed or anticipated tasks that a mentor may perform: coach, team builder, confidant, teacher, guide, advocate, etc. Unintended consequences stemming from a lack of clarity include: role collusion—taking the mentor role for granted resulting in nothing getting done; role diffusion—the mentor expects to be all things to all people; role confusion—blurred lines, mentor is also mentee's supervisor; and role protrusion—whereby the mentor injects themselves inappropriately into situations. These situations can be avoided when mentors set aside adequate time to engage in open, frank, explicit, and direct conversations about roles (Zachary, 2012)

Enabling growth or facilitating learning is the third phase in the mentoring process. In this phase, the real work begins. Three broad categories define this phase: managing the process, maintaining momentum, and encouraging movement (Zachary, 2012). When partnered with Daloz's (1999) three core conditions for facilitating learning (support, challenge and vision) a particularly good model is created (Zachary, 2012):

- Manage the relationship and support learning by creating a learning environment and building, maintaining, and strengthening the relationship.
- Maintain momentum by providing appropriate levels of challenge, monitoring the process, and evaluating progress.
- Encourage movement by providing a vision, fostering reflection, and encouraging personal benchmarking against desired learning outcomes. (p. 155)

The second part of Zachary's (2012) third phase of mentoring includes engaging in feedback and overcoming obstacles, celebrating the learning together, and redefining the relationship between mentor and mentee after the mentoring session ends. The final phase is this model has the mentor and mentee coming to closure. The process of closure, or learning conclusion, should be mutually satisfying to both parties and should be a consideration from the onset of the mentoring relationship. In *Mentoring 101*, John Maxwell (2008) stated, "if you want to grow and become the best person you can be, you must go about it with intention" (p. v).

Qualities of a successful mentor and mentee. Successful mentoring relationships begin by choosing the right people to sit in the mentor seat and the mentee seat (Collins, 2001). Successful mentors possess many skills through which they facilitate learning for both the mentor and the mentee (Maxwell, 2008; Zachary, 2012). Excellent communication and listening skills and a level of competency and effectiveness in their leadership positions with a

demonstrated ability to help others grow should be part of the selection criteria for mentors (Lawrence, 2008). Senior leaders should only be selected as mentors if they "genuinely desire to serve as mentors and are willing to spend time one on one" (p. 127); they should be good storytellers, offering perspectives from their experiences, and they should not have an agenda other than to help the mentee learn and grow. Mentoring requires more than giving the mentee information and skills. Rather, the mentor must help to raise the mentee to a higher level of learning and leadership by making him or her feel worthwhile, encouraging him or her, and believing in him or her (Maxwell, 2008). Informal mentoring is often provided by those closest in proximity: "Peers can also mentor and sponsor one another; friends at the same stage of their careers may actually provide more current and useful counsel" (Sandberg & Donovan, 2013, p. 74).

Maxwell (2008) identified steps to take in the development of a mentor's mindset: a set of guidelines to help a mentor think like a mentor. Successful mentors make the development of people a top priority and avoid being dismissive of people, as the unintended consequences can lead to a loss of productivity or low morale and lost relationships. Maxwell suggested the use of the Pareto principle (80/20) in determining the quantity of mentees to have. The Pareto principle in this context suggests that in developing people one should spend 80% of one's time developing 20% of the people. Any attempt to mentor more people than that at one time will result in spreading the mentor too thin. Excellent mentors develop relationships before starting out, taking the time to get to know the mentee and developing a level of trust that serves to build the relationship (Covey & Merrill, 2006). Successful mentors enter the mentor/mentee relationship giving help unconditionally, providing resources for personal and professional

growth, and removing obstacles that may get in the mentees' way. Mentors should help mentees repeat the process, as there is no success without a successor (Maxwell, 2008).

Practiced mentors operate along a "continuum of interaction to support learning for their colleagues" (Lipton & Wellman, 2003, p. 21). They move amongst consulting, collaborating, and coaching postures to cultivate their mentees' capacity to ruminate on practice, generate ideas, and amplify their professional self-awareness. Two major aspects define the posture a mentor will take in any learning focused conversation: the way information surfaces during a conversation and the "source of any gap analysis regarding such elements as planned goals and the actual outcomes" (p. 21) or mentee actions. In the consulting posture, the mentor produces or supplies the information and ascertains and extends expert analysis of gaps. The collaboration posture has the mentor and the mentee sharing idea development and gap analysis. The coaching posture has the mentee producing the information and analyzing gaps while the mentor paraphrases and asks questions to increase perspective and clarify details. Good mentoring relationships depend on regular interaction. Lawrence (2008) suggested that 2 hours per month is a good rule of thumb and interactions can occur in the form of face-to-face meetings, phone calls, emails, or a combination thereof.

Successful mentee candidates possess the ability to make things happen in their lives by walking the talk. They have the ability to see opportunities coming and surround themselves with influential people. Successful mentees add value to not only their organization but also the mentor by complementing weaknesses and encouraging strength. They attract other leaders, not just followers; they equip and empower others, possess an uncommonly positive attitude, live up to their commitments, and are loyal to the people around them and their organization (Maxwell, 2008). Successful mentees possess an appetite for learning, are willing to learn from their

experiences, both good and bad, and are willing to apply what they have learned through the mentor relationship (Lawrence, 2008).

Mentoring relationships bring many benefits to the people involved and the organizations for which they work (Lawrence, 2008). Organizations typically benefit from a greater retention of employees, more clearly charted executive careers, and greater overall leadership competency. Current and former mentees often make better team players, thereby strengthening organizations' cohesiveness. Benefits of the mentor relationship include facilitating increased communication and openness throughout the organization with the ability to extend individual learning to one's team or the entire system (Buck, 2004). Mentoring associations promote connections and cross-connections of parties to help them reach their goals (Bicego, 2006). Sandberg and Donovan (2013) posited that the mentor/mentee relationship confers a mutual benefit to both parties.

CETPA CTO Mentor Program

CETPA designed a curriculum based on the CoSN essential skills matrix that they call the *CTO Mentor Program*, which produces certified California school district CTOs. This program establishes high expectations for leaders in technology and forms a community of patronage through the mentoring relationship and collaboration among the various cohorts. The program also endeavors to enlighten Superintendents and District Leaders about the importance of a cabinet level CTO role. The curriculum for the CTO Mentor Program covers three essential strands and each strand has several subsets of topics (CETPA, 2011). Table 2 illustrates the CTO program offered by CETPA delineating the three strands, principles contained in the strands, and sub-strands of each principle. The curriculum is reviewed annually by the CTO steering committee for relevance and is structured to provide rigorous study of all essential skills needed to be a successful CTO. The CTO Mentor Program has been in existence since 2007, providing

training to 141 graduates to date, 112 of whom are certified. During this time CETPA has engaged a steering committee that oversees the development of curriculum, choice of candidates, and certification of candidates, in addition to providing general counsel to the CETPA ED, who is the designated project manager of the CTO Mentor Program. Although the collaboration between the steering committee and the ED has provided a fairly solid rudder guiding the course direction, learning outcomes and goals have been modified throughout the years without evidence to support the need for such changes. Curriculum and instruction have been modified throughout the years based on the interests of the instructors and perceived trends in K-12 education. Candidates are surveyed after each class to determine the reaction to the class and the instructor, but currently the practice of evaluating the efficacy of the instruction and whether the learning outcomes can be transferred to the job effectively is not measured. It is critical to the ongoing success of the CTO Mentor Program to determine the relevance and transferability of skills and knowledge acquired during the program.

Table 2

CTO Strands/Sub-strands

Strand	Principles	Sub-strands
Technology	Security Fundamentals	Information security, information security assessment, business continuity, risk assessment and budgeting for security
	Infrastructure	Data delivery and distribution and systems
	Technology Services	Hardware and software currency, planning for internal services and desktop support.
	IT Knowledge	Standards development and technical concepts

(continued)

Strand	Principles	Sub-strands
Education	Student Centered Aspects	Privacy and confidentiality, student data, integrating with other departments, local, community, state, federal requirements
	Staff Centered Aspects	Supporting Human Resources, classified/certificated aspects, the union environment, STRS/PERS and credentials.
	Assessment and Accountability	State assessments, defining accountability and local systems.
	Finance Centered Aspects	Sources of funding, mandated items and categorical funds, purchasing, bidding and vendor relations, facilities funding, attendance are planning.
Leadership	Professional Development and Training	Aligning training to state and district standards, developing a scope and sequence for training, research and development for training models, personal professional development.
	Vision and Technology Planning	Developing a vision for technology, assessing technology needs, involving stakeholders, developing a technology plan and assisting sites with technology plans, investigating future technology trends, designing sustainability models.
	Communications and Public Relations	Advising on the use of technology, developing vendor projects, collaborating on joint projects, communications with the public and with the school board, site visits, customer service and initiating
	Personnel Management	Recruitment, interviewing and selection, orientation, team building, staff communications, performance and evaluation, motivation, managing conflict.
	Organizational Management	Mission and goals, departmental organization, systems and solutions, managing change.
	Fiscal Management	Building a budget, decision tools (TCO/ROI).
	Project Management	Defining project management, using project management tools and projects and strategic planning

Note. Adapted from "Curriculum Overview," n.d., by California Educational Technology Professional Association, retrieved from http://cetpa.net/programs/cto_mentor_program /curriculum/. Copyright 2015 by CETPA.

Evaluation of Training Programs

The concept of evaluation includes two ingredients: assessing the students' change in behavior and encompassing multiple assessments (Tyler, 1971). Fast (1974) stated, "if we want to continue to improve and refine training we have to be able to determine whether or not program participants are really getting what they want" (p. 8). Training experts commonly agree that the difficulty of accurate evaluation is both complicated and far from adequate. Only when an exact method is developed for ascertaining how well attendees' needs are actually being met can a program be adapted and enhanced to achieve an attendee-program match (Fast, 1974).

Evaluation is defined as the "systematic investigation of merit or worth" (Joint committee on Standards for education evaluation, 1994, p. 3). "Systematic implies a focused, thoughtful and intentional process. Investigation refers to the collection and analysis of pertinent information through appropriate methods and technique. Merit or worth denotes appraisal or judgment" (Guskey, 2002, p. 46).

Educators must be knowledgeable and wise and must continue to learn. They must know enough in order to change and they must change in order to obtain different results. They must become learners and they must be self-developing (Easton, 2008). Professional development should be a decisive undertaking in the learning process (Guskey, 2002). Professional development can fall into the same "planning trap many teachers sometimes fall into; making plans in terms of what they are going to do, instead of what they want their students to know and be able to do" (Guskey, 2001, p. 60). When training is evaluated, it becomes more relevant. Evaluations of training programs will build credibility with people who are hesitant to participate in the experience (Kelley, Orgel, & Baer, 1984). However, efforts to evaluate frequently fail to detail the real value of training (Mezoff, 1981). Multiple measures of student learning should be included in evaluation (Joyce, 1993). "Good evaluations don't have to be complicated, they simply require thoughtful planning, the ability to ask good questions, and a basic understanding of how to find valid answers" (Guskey, 2002, p. 46).

Trainers share a concern that there must be hard evidence that learning has occurred and senior executives will want to see the results (J. Phillips & Phillips, 2009). Outcomes are assumed to exist and training programs appear to be necessary; however, more evidence is needed or executives may feel forced to adjust future funding. Fast (1974) stated that

"quantifying both the intangible attitude and tangible skills is at the heart of the evaluation problem" (p. 9).

McEvoy and Buller (1990) identified five levels of issues in training evaluation that must be resolved in order, from the top down. The first, work versus perk, describes the degree to which training programs are actually an effort to improve work performance, rather than a prerequisite for effective job performance. Organizations typically choose participants based on the foundation of prior success rather than the anticipation of developed impending performance. If training is about reward or re-inspiration of waning self-esteem, then simple *smile sheets* will serve for evaluation. Secondly, substance versus symbol refers to a culture of figurative significance being more important than the technical or substantive results as a result of the training. The degree to which anticipated training program results are internal or external to the program itself encompasses the third level. Once it is decided that the point of training is work related and that projected outcomes are "more substantive than symbolic and more external than internal" (p. 41) the question becomes, how do we measure the changes back at the job? Degrees of results(the fourth level) are only achievable when the skills being taught can be converted directly to on the job efforts or when substantial time and care are dedicated to establishing ROI targets during the training.

The fifth level presented is self-ratings versus other ratings.

> Two main approaches to measuring the effectiveness of management training programs are the participant self-report and the behavioral measure – to obtain behavioral measures someone else other than the participant rates him/her on the same outcome measures (skills, knowledge, or attitudes). (Mezoff, 1981, p. 57)

A chief reason that self-reports are erroneous is an instrumentation weakness known as "response shift bias – this is the propensity for a trainer to revise his/her internal standard for judging him/herself as a result of exposure to training" (Mezoff, 1981, p. 58)

Kirkpatrick – The Four Levels of Evaluation

Donald Kirkpatrick's concept of the evaluation process is most compatible with the andragogical ideologies and is practical in its formulations (Knowles et al., 2005). Kirkpatrick (2006) described three specific reasons to evaluate training programs:

- To justify the existence and budget of the training program by showing how it contributes to the organization's objectives and goals.
- To decide whether to continue or discontinue training program.
- To gain information on how to improve future training programs. (p. 21)

The Kirkpatrick model consists of four levels: reaction, learning, behavior and results. When all steps are present, an effective assessment of a training program is possible. Level one gauges the participants' reaction during the training process: what they like most or least and what feelings they have, positive or negative, toward the experience. Level two evaluates the learning that takes place through gathering data about the principles, facts, or techniques the candidates attain through the course activities. Level three identifies the behavioral changes that happen as a result of the training through self-rating scales, observations, interviews, and questionnaires. The fourth level, results evaluation, gauges the overarching effectiveness of the training program in creating sustainable change in the trainee (Kirkpatrick, 1996).

Level one – Reaction. For people to achieve the most benefit from a training program they must enjoy the experience; it must be interesting and motivating to those in attendance (Kirkpatrick, 1996). Level one of the Kirkpatrick model measures the attendee's reaction to the training experience. Although reaction is considered to be an easy measurement, Kirkpatrick (1996) stated that often trainers do not follow essential steps for accurately measuring training attendees' reactions. He submitted the following guidelines for measuring the level of reaction:

- Determine what you want to find out.
- Design a form that will quantify reactions.
- Encourage written comments and suggestions.
- Attain an immediate response rate of one hundred percent.
- Seek honest reactions through anonymity.
- Communicate the reactions as appropriate. (p. 57)

Many researchers and trainers feel that measuring participants' reactions is counterproductive as responses are often inaccurate (Boverie, Mulcahy, & Zondlo, 1994). Participants tend to underrate their skills prior to the training and overrate their skills following the training in an effort to justify their participation in the training (Conway & Ross, 1984). Carnevale and Schulz (1990) further claimed that attendee reactions are "easy to collect but provide little substantive information about the training's worth" (p. 15). Dixon (1987) and K. Phillips (2007) asserted that reaction assessments are responsible for more problems than benefits. He described three major problems that emerge from the use of reaction forms: (a) the expectation that training must entertain; (b) faulty instructional design, asking for information that attendees cannot provide; and (c) passive learning rather than active learning is perceived.

Level two – Behavior. Level two measures the knowledge acquired, skills improved, or attitudes changed as a result of the training. When ideologies and truths rather than practices are imparted, evaluating the learning becomes more difficult (Kirkpatrick, 1996). Kirkpatrick (1979) defined learning as the "principles, facts and techniques that were understood and absorbed by the participants" (p. 82). He suggested the following guidelines or standards for the learning evaluation:

- Each attendee's learning should be measured quantitatively and objectively.

- Pretests and posttests should be given allowing the learning to be attributed to the training. Endres and Kleiner (1977) stated that pretests and posttests are necessary when evaluating learning.
- When feasible, a control group should be employed to make actual comparisons with the actual training group
- When feasible, the evaluation results should be analyzed statistically to determine correlations and level of confidence.

Cantor (1990) suggested that a useful process for reviewing items intended to measure learning includes: (a) determining the acceptable task level by objective, (b) determining whether the objectives are adequate, (c) identifying the items associated with the objectives, and (d) determining whether the items match the objectives.

Level three – Learning (transfer). More difficult, but still very important, to measure is the "extent to which participants change their on-the-job behavior because of the training" (Kirkpatrick, 1996, p. 56). This process is often referred to as transfer of training; "Transfer is the evidence that what was learned is actually being used on the job for which it was intended" (Olsen, 1998, p. 61). The following major variables and influences are related to transferability:

- Similarity between training and the ultimate task.
- Amount of skills practice.
- Training simulations that will closely match the actual work setting.
- Feedback on how the skill is being performed and how facilitating on the job helps training. (p. 62)

Ellis (1965) concluded that teaching for transfer must have the following components:

- Teaching and the work setting must be similar.

- Adequate experience with the original task must be provided.
- A variety of examples should be used when teaching concepts.
- The most important features of the trained tasks should be identified clearly.
- The principles must be understood before transfer can be expected.

He further stated that transfer of learning may take three forms: (a) positive transfer, in which performance on one task supports a second task; (b) negative transfer, when one performance disrupts the other; and (c) zero transfer, in which no effect occurs or the effects effectively cancel each other out. Issues with transfer identified by Ellis are classified in into four major areas, the first three still being issues today: (a) research methodologies and problematic measurement techniques for transfer, (b) specification of transfer variables and their influence on learning, (c) development of adequate models and theoretical frameworks for organizing the knowledge regarding transfer, and (d) the development of educational technologies capable of translating and applying knowledge of transfer. Other influences that affect transfer include the time interval between tasks, the degree of original learning and increasing practice on the original task, the variety of practice methods used to practice the tasks, and finally the task difficulty. Other factors that can influence transfer include the:

> Integration of training to the work setting rather than an isolated occurrence, cues, reinforcement, a connection to the reward system, close and frequent supervisory (coaching and nurturing) feedback, group dynamics, employee attitudes about the work and the organizations, the type of training conducted, and consistency between what is being trained and its applicability in the real job setting. (Olsen, 1968, pp. 65-68)

There are very few examples in the human resource development literature of studies attempting to assess the transfer of training skills or knowledge to the workplace (Boverie et al., 1994). Endres and Kleiner (1977) suggested that multi-dimensional on the job evaluations, often referred to as 360-degree surveys (which include feedback from the attendee, his or her

subordinates, and his or her peers) eliminate the bias inherent in evaluating the attendee's knowledge transfer.

Level four – Results. By far the most difficult and most expensive factor to measure is the results or impact of the training on the organization (Kirkpatrick, 1996). In the case of the CTO Mentor Program, this would be the extent to which the technology leader affects change in the organization as a result of the training. Kirkpatrick (1979) noted that "there are so many complicating factors that it is extremely difficult, if not impossible, to evaluate certain kinds of programs in terms of results" (p. 89). Several attempts by researchers to qualify and quantify the results of training on organizations (Ban & Faerman, as cited in Boverie et al., 1994; McEvoy & Buller, 1990; Trapnell, as cited in Boverie et al., 1994; Zenger & Harris, as cited in Boverie et al., 1994) have resulted in the suggestion that "evaluation training on the basis of results or organization impact may not be the ultimate measure" (Boverie et al., 1994, p. 10).

Other Evaluation Paradigms

Others have presented paradigms for relating professional development and evaluation efforts. Guskey (2002) described five levels of professional development, asserting that, with each successive level, the method of collecting evaluation data gets a bit more complex. The first four levels support Kirkpatrick's four levels of evaluation, beginning with level one, which investigates participants' reactions to the professional development experience. In Guskey's second level, measures must show achievement of specified learning goals and evidence of successful learning need to be identified before activities begin. Focus shifts to the organization in his third level. Evaluation questions should be focused on the organization's qualities and characteristics necessary for success. Level four asks whether the new knowledge and skills that participants have acquired make a difference in their professional practice. The secret to

gathering applicable data rests in identifying clear indicators of both quantity and quality of implementation. Data may be obtained via surveys or scripted interviews with participants, oral or written personal reflections, or assessment of attendee portfolios; "Typically the more accurate information comes from direct observations, either with trained observers or by reviewing video or audio tapes" (p. 47). Data can be analyzed to help reform upcoming programs and activities to enable improved and more consistent implementation.

Guskey (2002) expanded on Kirkpatrick's model with the addition of a fifth level. This level assesses the bottom line by asking how the professional development activities affect students. Data describing a program's global influence can steer improvements in all facets of professional development, including program outline, application, and follow-up. Useful evidence can be gathered about whether a training program has added to unambiguous improvements in student learning. Guskey asserted that program planners should be sure to gather data on events that are consequential to stakeholders in the evaluation process.

In designing professional development to enhance student learning, the order of these levels must be inverted. In backward planning, one should first consider the student learning outcomes to be achieved (level five), then establish what instructional practices and policies will generate these outcomes (level four). Next, one should consider what organizational assistance is needed for the identified practices and policies to be executed (level three). Next comes the decision as to what knowledge and skills the participating professionals need in order to implement recommended practices and policies (level two). Finally, consideration must be given to how participants will obtain the opportunity to acquire that knowledge and those skills (level one; Guskey, 2002).

Newstrom (1978) argued for more arduous evaluation models, as simplistic approaches, such as Kirkpatrick's approach, are built on four assumptions. Explicit assumptions include four marked benchmarks for the evaluation of training—reaction, learning, behavior, and results—and these benchmarks are arranged in order of the significance of data to be gained through the evaluation. Implicit assumptions include reaction criteria, linked with Kirkpatrick's model, as the most commonly used, and therefore the norm for the profession; trainers commonly assume a "high sequential inter-correlation among these criteria" (p. 220).

In considering the evaluation of the CTO Mentor Program, the literature suggests that management training programs are more difficult to evaluate than blue-collar or practical skills training. Behavior change back at the job is difficult to measure (Galvin, 1983). The CIPP model, developed by "leading educators on the National Study Committee on Evaluation by Phi Delta Kappa" (p. 52), is an acronym formed from the four rudimentary forms of evaluation: context, input, process, and product. In developing evaluations using the CIPP model, four basic types of decisions are considered. Context evaluation helps with planning decisions, as it provides a rationale for determining objectives such as a needs assessment. Input evaluation guides structuring decisions, providing information to determine how to utilize resources to best meet program goals. Results include procedures, policies, budgets, and schedules. Process evaluation supplies feedback to the training organization through reaction sheets, rating scales, portfolios, and record analysis. Product evaluation gauges and explains the realization of objectives and should measure intended and unintended outcomes (Galvin, 1983).

The results of a survey conducted to compare the CIPP model (context, input, process, and product) to the Kirkpatrick model (reaction, behavior, learning, and results) indicated that more respondents preferred CIPP over Kirkpatrick's model. Results suggested that Kirkpatrick's

approach works when used for a narrow approach to curriculum development. The CIPP model was preferred significantly for the evaluation of management in education, whereas the Kirkpatrick model may be more appropriate for evaluating manual or technical skills (Galvin, 1983).

In addition to the paradigm or lens selected for the evaluation process, logistical considerations must also be addressed. Clegg (1987) recommended the following process as a result of a follow-up study to A. P. Sullivan's 1970 dissertation *An Analysis of Management Training Program Evaluation Practices in American Industry:*

- Organizations should consider an outside audit of the training program to avoid becoming stale or "ingrown." This will help instill fresh ideas for revitalization.
- Evaluation methods should be revised annually and adopt additional methods when appropriate.
- Training programs should not be conducted until objectives are established for the training programs. (pp. 65-71)

Chapter Three: Methodology

In this study, the researcher conducted an evaluation of the CETPA Chief Technology Officer CTO Mentor Program and its impact on technology leadership in K-12 educational organizations in California. The CTO Mentor Program has been in existence since 2007, providing training to 161 graduates to date with 158 course completers, 147 of whom are certified CTOs. For the purposes of this study, they were grouped into seven cohorts based on participation year. The curriculum for the CTO Mentor Program includes three essential strands—leadership, education, and technology—and each strand has several subsets of topics (CETPA, 2011). The curriculum is reviewed annually by the CTO steering committee for relevance and is structured to provide a rigorous study of all essential skills needed to be a successful CTO. Each candidate is partnered with a mentor who is currently employed in a K-12 school district or county office of education as an educational technology leader, with 10 years of working experience, and who has earned a degree in education or a related field in business, has a CTO certification, or demonstrated work experience.

Restatement of the Research Questions

The following questions served to focus the research process:

1. To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations?
2. To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives?
3. To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance?

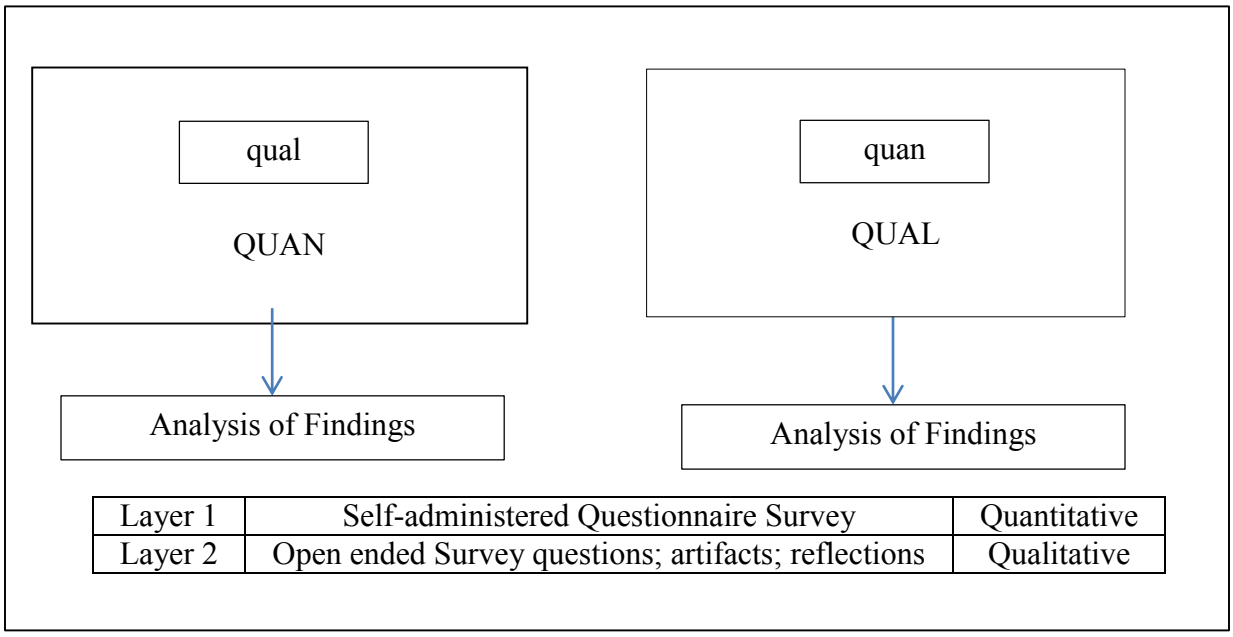
This chapter will explain the methodology for this research, describing the data source, data acquisition strategies, instrumentation validity and reliability, and data analysis processes. Following the research explanation, the chapter includes the process of submission to the Institutional Review Board (IRB) for human research consideration.

Research Design

A concurrent embedded multi-level mixed method design (Tashakkori & Teddlie, 2010) with data collected from two layers of analysis was employed in this intrinsic case study (Creswell, 2007). This case study is a bounded system, bounded by participation in the CTO Mentor Program (Stake, 1995). In this design type, "qualitative and quantitative data are collected simultaneously" (Creswell, 2009, p. 214) with the intent of painting a complete picture of the research problem identified in Chapter One (Stake, 1995). A graphical representation of the research design of the study noting the two layers of analysis is shown in Figure 1. This figure is adapted from the design system utilized by Creswell, Plano Clark, Gutmann, and Hanson (2003).

The nature of this study was both quantitative and qualitative, examining the extent of knowledge participants, gained during the participation in the CTO Mentor Program, the perception of efficacy of the CTO as a result of completing the 8-month course of study, and the relevance and effectiveness of mastering the program's learning objectives. The quantitative data were collected via a self-administered questionnaire survey, measuring the relevance of the identified learning outcomes and the degree to which the candidates acquired the intended knowledge, skills, and attributes desired of graduates of the CTO Mentor Program. The quantitative survey produced by the researcher is an amalgamation of two common frameworks. The first, Kirkpatrick's (1996) Four Level model, focused on reaction, behavior change, and

impact. The second, J. Phillips' (2000) Impact Questionnaire for Leadership Development, focused on the transferability of the learning to the workplace. Permission was granted to use all or parts of existing survey questions from the publishers (see Appendices A-D).



Layer 1	Self-administered Questionnaire Survey	Quantitative
Layer 2	Open ended Survey questions; artifacts; reflections	Qualitative

Figure 1. Concurrent embedded design with two layers of analysis. Adapted from "Advanced Mixed Methods Designs," 2003, by J. W. Creswell, V. L. Plano Clark, M. Gutmann, and W. Hanson, p. 210, in A. Tashakkori & C. Teddlie (Eds.), *Handbook of Mixed Method Research in the Social and Behavioral Sciences,* Thousand Oaks, CA. Sage. Copyright 2003 by the authors.

The qualitative data were gathered through an open ended self-administered questionnaire survey as well as artifacts and reflective writings produced by candidates as they progressed through the CTO Mentor Program. Participants in the CTO Mentor Program produce artifacts to support their learning, write reflective essays describing the impact the course of study had on a single event or their leadership experience, and demonstrate learning through presentations, with a final portfolio required upon completion of the course. The extensive, multiple sources of information in data collection were used to provide an in-depth picture of the CTO Mentor Program experience (Asmussen & Creswell, 1995). The data collected were cross-sectional (qualitative student data of the 2012, 2013, 2014 cohorts) and longitudinal (quantitative

survey of all CTO participants, mentors, and instructors). The quantitative and qualitative data for Research Questions 1, 2 and 3 were collected and analyzed at roughly the same time with data integration occurring during the collection, analysis, and interpretation phases. The qualitative data from the 2013 cohort were provided electronically through the CETPA ED, as all evidence during this course of study was collected electronically. Artifacts from CETPA were collected in Edmodo (a learning management system), Google docs and Google sites.

Data Sources

The data for this study came from the CETPA CTO Mentor Program. The target population consisted of all participating members in the CTO Mentor Program (141 candidates). Also included in this population are CETPA members who have functioned in the role of mentor, instructor, and/or steering committee members. Demographic information in the self-administered survey questionnaire served to stratify the sample, allowing the researcher to evaluate responses on multiple levels. Demographic data collected included gender, age, ethnicity, current position held, type of school or district employed by, number of years in the current position, role in the CTO Mentor Program, and cohort year.

The researcher employed maximum variation in the sampling strategy to allow diversity of subjects in order to fully describe multiple perspectives. The goal was to yield a minimum response rate of four to five responses per cohort and per sub population of mentors, instructors, and steering committee, as this would have provided ample opportunity to identify themes in the case as well as allow for cross-case theme analysis (Creswell, 2007).

Access to the sample population and program data was requested via email correspondence with the ED/Program Manager of the CETPA-CTO Mentor Program (Appendix E). The email request provided a general explanation of the purpose of this study. Once

permission was obtained and the contact information for the sample was released, the researcher communicated via email to all CTO participants to request their participation in this case study. The researcher provided an informed consent form to the participants informing them about the purpose of the research, explaining what their participation would entail, and a offering detailed account of their rights as human research subjects.

Upon return receipt of the informed consent form and after permission to utilize class artifact data was confirmed, the researcher sent an email to the participants containing a hyperlink to the online survey instrument. Participants were given 30 days to complete the survey, during which time the researcher gathered artifact data from the program coordinator for the 2012, 2013, and 2014 cohorts. Upon completion of the online survey, the researcher downloaded the raw data from Survey Monkey into a Microsoft Excel spreadsheet and saved them onto an external Seagate hard drive. The file was password protected and the hard drive was stored in a locked cabinet while not in use for data analysis. The researcher accessed class artifact data through emails from the CTO Mentor Program director containing hyperlinks to the candidates' online portfolios, Edmodo archives, and level one survey data completed by candidates at the end of each class session during the time of class participation.

Instrumentation

The survey instrument design was adapted from and incorporated questions from existing instruments: J. Phillips' (2000) Impact Questionnaire for Leadership Development and Kirkpatrick and Kirkpatrick's (2007) *Implementing the Four Levels*, specifically levels one (reaction), two (learning), and three (behavior). The survey instrument can be found in Appendix F. Table 3 demonstrates the questionnaire item alignment to the research questions.

Table 3

Questionnaire Item Alignment to Research Questions

Variable Name	Research Question	Item on Survey
Independent Variable: Participation in CTO mentorship program	RQ 1,2,3	1-12
Dependent Variable: Perception of effective technology leadership	RQ1	14A/B, 17-18, 20
Dependent Variable: Relevance and effectiveness of mastering the program's learning objectives	RQ 2	15-17, 23
Dependent Variable: Transferability of learning activities to on the job performance	RQ 3	17, 19, 21, 23

The survey instrument consisted of three parts (see Appendix D). Part one gathered the demographic information necessary to stratify the sample, which facilitated the illustration of subgroups and comparisons of subgroups (Creswell, 2007). Part 2, Section A served to measure Kirkpatrick's level one (reaction) and level two (learning) through a 5-point Likert scale ranging from *Strongly Agree* to *Strongly Disagree* to measure reactions to statements addressing the following categories (Kirkpatrick, 2006):

1. Administration and logistics (prerequisites, facilities, and equipment);
2. Content (understood the objectives and the objectives were met);
3. Design (method of delivery, materials, length of class time, organization);
4. Instruction (satisfaction with instructors);
5. Perceived impact (knowledge and skills increased, applicability of current job, applicability for preparing participant for other job, training helped toward other jobs in company); and,
6. Overall satisfaction with the class. (pp. 395-396)

Part B of Section two measures Kirkpatrick's levels one, two, and three (behavior) through a 5-point Likert scale ranging from *to a very great extent* to *not applicable* addressing the following categories :

1. Use of skills from training (opportunity to use the training, actual use of training);
2. Confidence in ability to perform (extent of increase in confidence resulting from this training);
3. Barriers to and enablers of transfer (training accurately reflected the job, access to necessary resources to apply the training, extent of coaching and other assistance), and;
4. Measures of impact (percentage of change in production and performance). (pp. 397-398)

Section three of the survey instrument measured the relevance of the program elements (e.g., group discussion, classroom activities, and mentor relationship) and their role in the mastering of the programs' learning objectives in a 3-point Likert scale ranging from *very relevant* to *no relevance* addressing the categories mentioned above.

Validity

Researchers universally recognize the need for accuracy in measuring data as well as the need for logic in interpreting the meaning of those measurements (Stake, 1995). Experts on mixed methods studies advocate for the use of validity procedures for both the quantitative and qualitative phases of the study (Tashakkori & Teddlie, 2010). Traditional validation of mixed method studies would dictate that the researcher "discuss the validity and reliability of the scores from past uses of instruments employed" (Creswell, 2009, p. 219) and utilize strategies such as

triangulation of data sources to check the accuracy of sources for qualitative data (Creswell, 2009).

Greene (2006) posited that the development of inquiry methodology requires the consideration of four connected, but conceptually distinct, domains. Each domain consists of a set of issues that "are relevant and important to the practice of social inquiry" (p. 93). The four domains engaged in methodologies for social research include: "philosophical assumptions and stances, inquiry logics, guidelines for practice, and sociopolitical commitments in science" (p. 93). Domain one directs the researcher to look at specific conditions in specific ways offering "appropriate philosophical and theoretical justification for this way of seeing, observing, and interpreting" (p. 93). Domain two refers to what is commonly called *methodology* in social science and gives structure to the study "so that what is important to see is observed, recorded, and understood or explained in defensible ways" (p. 94). Domain three provides "specific guidelines for inquiry practice – it is the 'how to' of social science inquiry" (p. 94). Included in domain three, for example, are strategies for sampling, techniques for analysis, methods for data gathering, analysis interpretation and reporting techniques, and a variety of statistical procedures such as simultaneous regression and hierarchical linear modeling (Greene, 2006). The final domain addresses how the inquiry fits into society by asking: Does the study produce knowledge? Does the study advise policymakers? Is the study located in a protected, sheltered space, or does it reside in the middle of a social conflict?

Greene (2006) used a journey metaphor to help readers understand the relationship among the four domains. Through this lens, domain one "guides the inquirers' gaze toward the subject to study" (p. 93). Domain two provides a global positioning system (GPS) to "position the inquirer in the correct context and offers navigational tools to direct the journey in context"

(p. 93). Domain three "provides the water bottle, hiking boots, and trail map, needed to journey" (p. 94) from domain one to domain two. Finally domain four "directs the inquirer's journey toward a particular destination" (p. 94).

Onwuegbuzie and Johnson (2006) use the term *legitimation* in lieu of validity, as postmodernists view the concept of validity as one that represents a "debunked modernist perspective that champions universal rationality, rules, order, logic, and the like" (p. 55). The term legitimation is also used by both qualitative and quantitative researchers and is consistent with what Tashakkori and Teddlie (2010) referred to as a "bilingual nomenclature" (p. 12), which validates Kuhn's (2012) contention that using commonly agreed upon vocabulary can preclude a communication breakdown (Onwuegbuzie, Johnson, & Collins, 2011).

Legitimation directly engages the challenges of mixed method data integration and interpretation stemming from the use of "different frameworks, stances, methods, samples, and analyses" (Greene, 2006, p. 96). Onwuegbuzie and Johnson (2006) have identified nine types of legitimation, commonly referred to as validation:

- Sample integration: The extent to which the qualitative and quantitative sampling designs yield quality;
- Inside-outside: The extent to which the researcher appropriately present and use the insiders' view and observers' view to describe and explain;
- Weakness minimization: The extent to which the strengths from one approach offset the weakness of another approach;
- Sequential: The extent to which meta-inferences could be affected by reversing the qualitative and quantitative phases;

- Conversion: The extent to which quantifying or qualifying yields quality meta-inferences;
- Paradigmatic mixing: The extent to which the researchers' world view beliefs that underlie the quantitative and qualitative approaches are combined or blended into a usable package successfully;
- Commensurability: The extent to which the meta-inferences may reflect a mixed worldview based on the Gestalt cognitive process of switching and integration;
- Multiple validities: The extent to which the use of traditional qualitative and quantitative types result in high quality meta-inferences; and
- Political: The extent to which the consumers of mixed method research value the meta-inferences stemming from both components of the study (p. 1256).

The nine types of legitimation map to Greene's (2006) four methodological domain and clearly demonstrate how legitimation in mixed research is a continuous, iterative process as opposed to a procedure that occurs at a specific time in the process (Onwuegbuzie et al., 2011).

For the purposes of this case study, the researcher employed legitimation types, specifically sample integration, inside-outside, weakness minimization, sequential, conversion, paradigmatic mixing, and multiple validities throughout the study to "illuminate or nullify some extraneous influences" (Stake, 1995, p. 114). Data source triangulation served to determine the validity of the qualitative and quantitative research. Combining qualitative and quantitative research in triangulated validation allows for data corroboration (Bryman, 2008). Triangulation of the various data helps the researcher determine if "what is observed and reported carries the same meaning under different circumstances" (Stake, 1995).

The usability of the quantitative survey came from an external review of the instrument through field testing. The researcher selected three technology leaders who had no affiliation with the CTO Mentor Program to review the instrument and provide feedback on access to and navigation within the online survey tool, noting any technical difficulties experienced, clarity of directions, typographical or grammatical errors, and general observations. The field test results and participant feedback supported the validity and clarity of the survey and data collection method. Guiding questions for the field test included (Schultz, 2008):

1. Overall, how easy was it for you to access the survey and navigate from page to page?
2. Please describe any technical problems you experienced while attempting to navigate through the survey.
3. Were the instructions clear and easy to understand? If not, how can they be made easier for first time survey respondents?
4. Were there any typographical or grammatical errors that you discovered?
5. Please share any other comments or suggestions you have that would help make this survey more successful.

Following the field test, all modifications were noted by the researcher.

Data Collection Procedures

Data collection is the most critical step of the evaluation process, because without data, there is no evidence of program impact and therefore no evaluation study can be conducted (J. Phillips & Stone, 2000). Data were collected in two layers concurrently during this case study. Data collection commenced after receiving IRB approval and occurred over a 1-month period. The first layer of data was collected via self-administered questionnaire survey, built using the

online survey tool SurveyMonkey. A link to the survey instrument was sent via email to all participants in the case study. The results collected from the online survey were exported from the SurveyMonkey site into an Excel spreadsheet and saved to the researcher's computer with password security applied to the file. The qualitative data were obtained from the CTO Mentor Program director through email with embedded hyperlinks with archived data made available to the researcher. Physical evidence (artifacts, reflections, essays) collected from the CTO program was stored at the researcher's home and locked in a file cabinet to safeguard confidentiality and fidelity of data.

Electronic program data collected from the CTO program manager was stored electronically on a Seagate Free Agent external hard drive, secured with password protection. The external hard drive was stored in a locked safe, keeping all data confidential. Data did not include any personal identification of participants.

Data Analysis

Data collected from the survey questionnaire were analyzed using descriptive statistics, providing an overview of the CTO Mentor Program participants. Current position, title, participation and role in the CTO program, and cohort year were treated as categorical values, calculating the frequency in each category. The researcher used the computer software program QSR-NVivo and its analytic tools for the descriptive analysis and it will be employed to analyze both the quantitative and qualitative data from both the survey questionnaire and the artifact data provided by the CTO Mentor Program director. NVivo is specifically designed to handle non-numeric data, providing tools to the researcher to ask questions about the data as well as facilitating identifying connections between data sets (Bryman, 2008). Utilizing computer

software programs for data analysis offers researchers many ways to facilitate data analysis (Creswell, 2007; Silverman, 2005):

- Computer applications help store and organize data.
- Computer applications facilitate text location associated with a theme or code.
- Computer applications facilitate location of related code labels.
- Computer applications facilitate code label comparisons.
- Computer applications facilitate the creation of graphical images of data.

Once artifact data were collected, the researcher read through all raw materials to obtain a feeling or sense of the case (Stake, 1995). During the preliminary reading, the researcher noted themes (e.g., effectiveness, relevance, transferability) as they appeared, analyzing the data for underlying meaning. Uploading the electronic artifact data into the QSR-NVivo occurred next, facilitating the coding process (Wright, 2005). Responses were sorted and grouped by research question "seeking linkages between program arrangements, activities, and outcomes" (Stake, 1995, (p. 53). Themes and patterns related to the research questions were identified by the researcher through categorical aggregation (Creswell, 2007; Roberts, 2010).

To ensure validation of the qualitative data, the researcher utilized a blind coding assistant who was not affiliated with, nor had prior knowledge of, nor had any expectations of this case study. The selected coder was an experienced educational researcher who had completed a Master's degree in Business and was working on a doctorate degree in education from a prominent Southern California university. The researcher had the coding assistant review the results of the survey electronically using Microsoft Excel, highlighting text in colors previously agreed upon. Once the coding assistant completed analysis of the data, the researcher met with the coder to narrow and merge similar codes into a new list of master codes that could

be applied during additional cycles of review. The use of multiple sources of analysis (researcher, computer software, blind coder) reduces the potential bias of a single researcher collecting and analyzing the data (Roberts, 2010), and was likely to shed light on or cancel out some extraneous influences (Stake, 1995).

The researcher inserted the new list of master codes into the QSR-NVivo and ran a third round of analysis "drawing tentative conclusions, organizing data according to issues" allowing the researcher to organize the final report (Stake, 1995, p. 53). Following this review of the data, the researcher determined the necessity of conducting interviews for clarifying data. The researcher described in extensive detail the results of the findings of the case study utilizing the data obtained during the analysis phase of the case study as well as methods used to analyze data. Rationale for analysis techniques was also stated.

Limitations

This case study was limited to participants' self- reported perceptions of the experience in the CTO Mentor Program and their transferability of skills learned since the time of program completion. Access to archival artifacts may have been limited due to participant permission. It is also important to note that the researcher is a graduate of the CTO Mentor Program and a board member of the parent organization, CETPA, and a CTO, which increased the chance for bias to occur.

Human Subjects Consideration and IRB Review

The researcher proposed an exempt review from the IRB, as there were no psychological repercussions resulting from participation in this study. All participants received an informed consent document (Appendix G) providing specific information as to the purpose of this research, level of participation, participants' privacy and protection throughout the study

(including the data gathering process), coding procedures and analysis. Furthermore, the consent document outlined in detail the voluntary nature of the study, the possible benefits of the research, and any potential risks associated with participation.

Summary

Chapter Three presented the methodology for this case study research describing the process of the proposed sample, data acquisition strategies, instrumentation validity and reliability. The data collection procedures and data analysis process were presented along with the study limitations and IRB review proposal.

Chapter Four: Results

This study involved an evaluation of the CETPA CTO Mentor Program and its impact on technology leadership in K-12 educational organizations in California. The purpose of this study was to determine the efficacy of the CTO Mentor Program and its effect on the K-12 technologists' perception of effective technology leadership. The goal of the study was to generate a detailed case study and to identify the perceived relevant program learning objectives and activities that impacted the CTO participants and ultimately the organization for which they work. The research began with the gathering of quantitative and qualitative data via an online survey followed by the qualitative reflective artifact data. Thus, the methodology is categorized as a concurrent embedded multi-level mixed method design.

Chapter Four presents the findings of this case study. Data were gathered in two layers; survey data were gathered for a period of 30 days, commencing in August 2014, and reflective writings from the mentor candidates' portfolios were gathered concurrently with assistance from the CETPA CTO Mentor Program coordinator.

Restatement of Research Questions

The following research questions were used to achieve the goals of the study:

1. To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations?
2. To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives?
3. To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance?

Participants in the study represented eight cohorts from 2007-2014 with the majority of responses returned from the 2007 (12.19%), 2012 (17.07%), 2013 (28.89%), and 2014 (14.06%) cohorts (see Figure 2 for details).

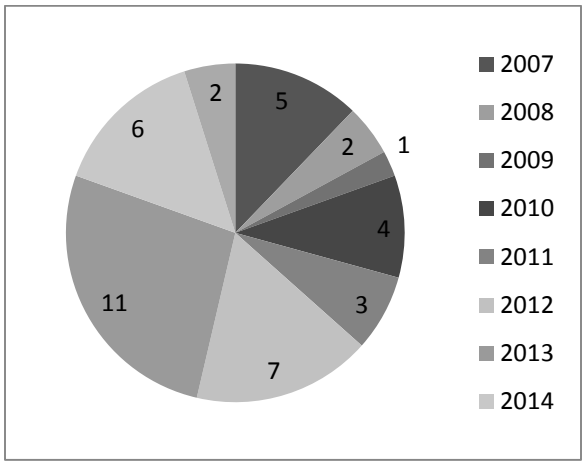


Figure 2. Demographic information: Cohort years represented.

Description of the Data Gathering Process

Survey data gathering process. In August 2014 an email was sent from the ED of CETPA inviting all CTO mentor candidates to participate in an electronic survey. The respondents clicked on a link in the email to begin the survey. The respondents took between 4 minutes to 1 week to complete the survey instrument, with the majority completing the survey within 21-37 minutes. SurveyMonkey was used to create the survey and gather the data. Fifty-two responses were received, five of which were duplicates (this was determined by analyzing the IP addresses of the responses). The 48 remaining responses contained 13 incomplete responses; of the 13 incompletes, seven were removed from the sample, as they contained no data that could be used to answer the research questions. The researcher determined that six of the incomplete surveys should be kept in the sample as they contained several responses to the survey questions. As a result, the answers from 41 respondents, or 85%, were used in this mixed method study.

Artifact data gathering process. Embedded into the aforementioned survey was the opportunity for respondents to grant the researcher access to artifact data by indicating *Yes* or *No* on the first question along with their initials (first name and last name only) for identification purposes. The researcher sent the list of initials and corresponding CTO Mentor cohort year to the ED of CETPA, who returned the list with the hyperlink to the online portfolio of 15 respondents. The researcher decided to use only the electronic portfolio artifacts available from the 2012, 2013, and 2014 cohort years, as these data were most current and were available in electronic form. Once the researcher was granted access to the online portfolios, each reflective writing document was downloaded to the researcher's computer and placed in a virtual folder labeled with a random NVivo ID. The researcher then uploaded the folders into the analytical software, QSR-NVivo, for coding and analysis.

Description of the Respondents

Description of the survey respondents. As stated previously, the survey was sent out to CTO Mentor participants from each of the eight cohorts (2007-2014). There were 52 responses of varying levels of completeness, including five duplicate responses. Forty-one, or 85%, were determined to be useable. The demographic information presented in Figures 2-5 will serve to paint a clearer picture of the survey respondents.

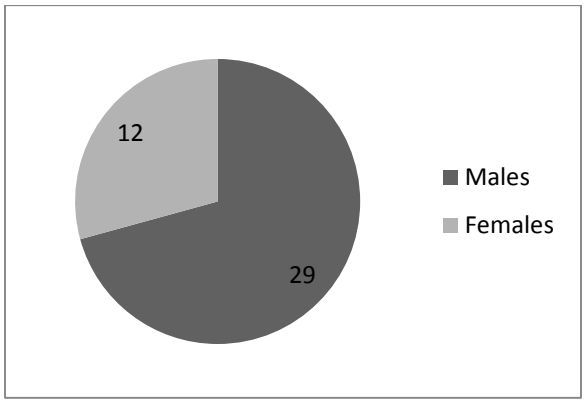


Figure 3. Demographic information: Gender.

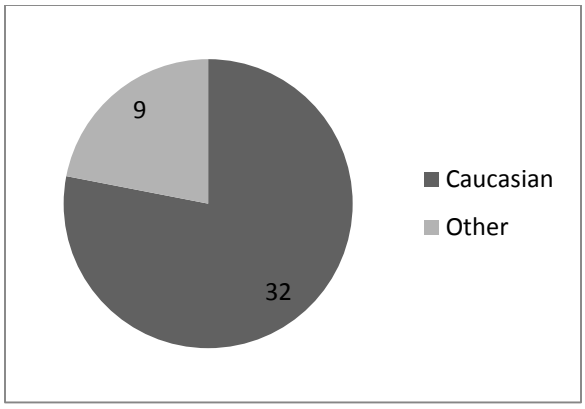


Figure 4. Demographic information: Race.

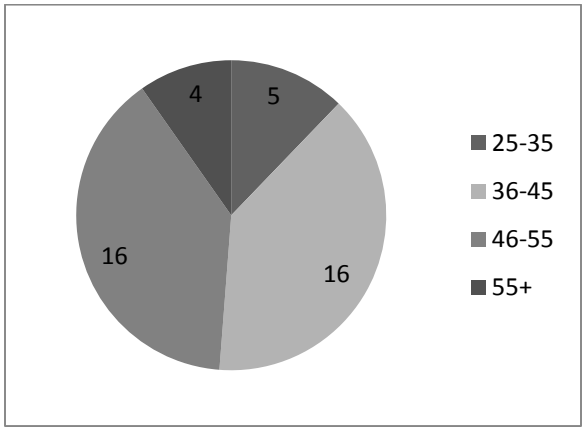


Figure 5. Demographic information: Age.

The majority of the respondents worked in K-12 school districts (26, or 63%), with County Offices of Education representing 21%, or 8 respondents. Respondents also represented private schools (1), charter schools (1), High school districts [grades 9-12] (2), and other educational agencies (3).

The most commonly held title by respondents was Director of Technology (37% of responses), followed by Technology Coordinator (11%) and CTO (11%). However, many other titles were also represented in this sample:

- Director of Administrative Operations
- Technology Services Manager
- ED of Technology Services

- Network Systems Engineer
- Client Services Officer
- IT Specialist
- Student Information System (SIS) Coordinator
- Network Administration Supervisor
- Applications Manager
- Business Analyst
- Database Analyst
- Educational Technology Specialist

Description of portfolio subjects. From the survey results, 15 portfolio subjects were chosen based on their willingness to share portfolio data. Cohort years represented include 2012 (5), 2013 (6), and 2014 (4). Sixty-six percent of the respondents were men (10) and 33% were women (5). The majority of the portfolio respondents were 36-45 years of age (53%).

Answers to Research Questions

Research question 1. Research question 1 asked, To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations? The researcher will present the qualitative data from survey questions 14 and 18, which relate to RQ1. Secondly, positive and negative responses received via open ended responses to questions 14 and 18 will be presented. Thirdly, the researcher will provide data from the reflective artifacts coded using the following: prior experience, better understanding, essential skills, and year-end confidence growing. Finally, the researcher will discuss the results in relationship to Kirkpatrick's levels of evaluation.

Quantitative data from the survey supporting RQ1. Question 14 contained 15 sub questions and asked the respondents to "Indicate the extent to which you think your application of knowledge, skills, and behavior learned from the CTO Mentor Program had a positive influence on the following business measures in your own work or your work unit." Table 4 displays the descriptive statistics for survey items pertaining to the candidates' readiness to participate in the CTO Mentor Program, the relevance of the program to their work, and their overall satisfaction with the course. These items were rated using a 5-point Likert scale (1 = *Strongly Agree* to 5 = *Strongly Disagree).* All items were met with agreement, although respondents strongly agreed that the program increased the participants' knowledge and skills and that the knowledge and skills learned were directly applicable to their jobs.

Table 4

Survey Items (Question 14) Pertaining to RQ1—Kirkpatrick's Level One (Reaction) and Adult Learning Theory—Sorted by Highest Level of Agreement

Survey Item	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Question Skipped	Mean	Standard Deviation
a. My knowledge and/or skills increased as a result of this course	28	11	1	0	0	1	6.83	4.45
b. Overall I was satisfied with the instructors	10	29	1	0	0	1	6.83	4.29
c. The knowledge and/or skills are directly applicable to my job	28	12	0	0	0	1	6.83	4.25
d. The course met all of its stated objectives	9	29	2	0	0	1	6.83	4.24
e. I had the knowledge and/or skills required to start this course	10	27	3	0	0	1	6.83	3.94
f. Overall, I was satisfied with this course	23	17	0	0	0	1	6.83	3.87

(continued)

Survey Item	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Question Skipped	Mean	Standard Deviation
g. The course has helped prepare me for other job opportunities within the company or industry	25	11	2	1	0	2	6.83	3.63
h. Participant materials (handouts, workbooks, etc.) were useful during the course.	13	24	3	0	0	1	6.83	3.63
i. The facilities and equipment were favorable to learning	6	25	7	1	0	2	6.83	3.48
j. I clearly understood the course objectives	11	24	3	2	0	1	6.83	3.40
k. The way the course was delivered (such as classroom, computer, and video) was an effective way for me to learn this subject matter.	14	22	3	1	0	1	6.83	3.38
l. The course content was logically organized	11	23	6	0	0	1	6.83	3.36
m. I had enough time to learn the subject matter covered in the course	6	23	9	2	0	1	6.83	3.21
n. I was able to take this course when I needed it	13	21	4	1	0	2	6.83	3.12
o. I had an opportunity to give input to the course design or content	10	14	11	4	1	1	6.83	2.07

Note. $N = 41$. Ratings based on 5-point metric: 1 = Strongly Agree to 5 = Strongly Disagree

Qualitative survey results supporting RQ1. Research question 1 asked, To what extent are there differences before and after a candidate's completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations? This section will summarize the main themes from respondents' responses to the open-ended survey questions 14 (see Table 4 for quantitative responses) and 18.

Responses to survey question 14: Examples and details. The qualitative section of research question 14 stated, "Please cite specific examples or provide more details," resulting in the major themes *program benefits* and *program criticism*, which included comments on the rigor of the program.

Program benefits. Fourteen of the 37 survey respondents answered question 14. Six of the 14 felt that the CTO Mentor Program was geared toward improving leadership skills with material that was broad enough to touch on beneficial aspects of technology consideration. Additional curriculum areas positively noted by respondents 5 and 12 included "management/leadership distinction…was tremendously valuable" and the "exercises we did in class were directly applicable" to the job. Respondent 18 stated, "this course validates some of my current knowledge and expanded my skills to help me take a broader view of district processes that relate to IT." Several respondents commented on the relationship and connection building that occurred as a result of participating in the CTO Mentor Program. Respondent 5 commented that "the relationship with my mentor, instructors and classmates were tremendously valuable. The course created a professional network for me that continue to benefit me years after completing the program."

Program criticism. Four of the 14 respondents provided critical observations of the CTO Mentor Program. Respondent 30 indicated that "this course was more work than either one of my Master's degree with the pre-requisite assignments, the portfolio and additional homework." Two respondents indicated that the amount of work requested was too much, "with a full time job and family – it was too strenuous for just a certificate." Other observations included comments about the facility; "the facility had issues with AC and internet" (R30) as well as the program processes, "the mechanics for distribution of resources (Edmodo) did not work very well" (R20). Finally, there appeared to be a "disconnect between instructors, mentors and the steering committee which seems to have a different idea of what is acceptable" (R30), with respect to the quality of work submitted.

Responses to survey question 18: How has participation changed your work? Qualitative responses to survey question 18—which asked, What has changed about you or your work as a result of your participation in this program?—yielded themes including *increased communication, increased confidence,* and *better understanding.*

Increased communication. Respondents indicated that their personal growth stemmed from developing more effective communication skills and organizational skills, as well as increased confidence at the workplace. Increased communication was addressed by 10 of the 33 responses to this question, providing observations such as: "I have worked really hard on communicating better with my staff" (R31), "My communication skills have also improved when dealing directly with cabinet members and school board members" (R18), and "the CTO Mentor Program helped me to a greater understanding and improved communication with educators about the Ed Tech needs" (R35). Several respondents reported an increase in organizational skills, facilitation skills, and time management skills, including an increase in delegation of tasks to others in their department.

Increased confidence. The most significant area of personal growth identified by the respondents was a feeling of increased confidence as a result of participating in the CTO Mentor Program. Eleven of the 33 respondents indicated they had developed a level of confidence that enabled more effective decision making and validated ideas on leading technology as relevant and innovative. Additional examples of increased confidence included taking on new leadership roles, participating actively in meetings, and planning technology initiatives strategically.

Better understanding. Although the themes stated previously are labeled as forms of personal growth, they also have a connection to professional growth through increased communication, organization, and confidence. However, in addition to the personal themes

stated previously, respondents identified having a better understanding of the leadership role and of the entire organization, which resulted in relationship building and effective collaboration. Respondents 17 and 4 indicated that "everything taught had some impact on my job duties" resulting in a "greater cache among my executive colleagues." Organizational awareness was increased for respondent 28, whose "eyes were opened to the visionary/leadership aspects of the CTO role and how our contributions affect student learning."

Qualitative artifact data supporting RQ1. Research question 1 asked, To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations? To answer this question this section will summarize the main themes from the reflective artifacts created by the candidates during their program experience. The objective of the reflective artifact is to help the candidate identify his or her feelings related to the learning that occurred while creating the portfolio artifact, to self-analyze how this learning experience increased his or her knowledge and changed his or her work behavior, and to determine what effect the change has had on his or her work performance. As stated earlier, the qualitative artifact data were coded using the following themes: *prior experience, better understanding, essential skills,* and *year-end-confidence growing.*

Prior experience. Adults bring prior experience and knowledge to any new learning experience, and of the 15 portfolio participants, 11 came to the program with years of experience (ranging from 6-21) in the field of educational technology. However, prior to holding the technology leadership position, candidates stated that formerly held positions of Accountability and Testing Coordinator, Principal, and Director of Elementary Education, as well as advanced degrees in management and organization development provided a foundation for which

information obtained during course work would enhance prior knowledge. Personal interests and hobbies also provided a foundation that allowed candidates to connect to new information, making the learning relevant.

Candidates indicated an appreciation that the instructors recognized the background and experience they brought to the cohort by asking candidates to share their stories and provide input to the subject area being discussed. Candidates also commented that while the information wasn't new, they were reminded of "the importance in targeting the right audience and listing outcomes in the professional development plan" (R32), and "how important it is to value the role each person plays on the team and to always maintain the vision of empowering teachers" (R30). Respondents 28 and 33 commented that "they were surprised at how much they already knew, or at least had been exposed to or had cursory knowledge of" and that "there was an incredible amount of information covered that was highly applicable to all realms of my job."

Better understanding. The reflective writings clearly document that a better understanding of the educational environment was obtained due to the participation in the CTO Mentor Program. Twelve of the 14 areas presented in the course were identified as having an impact on the candidates, with the majority of the comments focused on the *Technology, Infrastructure and Data Systems, Organizational Management,* and *Staff and Student Centered Aspects* courses. However, other areas of note include *Leadership/Strategic Planning, Finance Centered Aspects/Fiscal Management, Educational Technology, Personnel Management,* and *Technology Policies-Standards-Plans.*

Candidates expressed that they gained a better understanding of the Student Information System (SIS):

- "Before this class, I had little knowledge of our most important system, our SIS. This class forced me to familiarize myself with our processes and procedures in regards to attendance and the database maintenance" (R26).
- "It was very useful for me to learn more about the functionality of our SIS by creating a working tutorial" (R20).
- "Having discussions with the applications team helped me to better understand their roles and how they work collaboratively in deploying and maintaining our SIS" (R20).
- "Conversations with colleagues from the CTO Program about their SIS have really impressed me in terms of these systems having become accessible via mobile apps, online registration, real time notifications to parents regarding absences, health office visits, etc." (R22);.
- "Since I have had very little interaction with a SIS, this class was good exposure for me to get a better understanding of these systems" (R31).

Respondent 33 stated that the Organizational Management class provided "an incredible amount of information that was highly applicable to all realms of my job;" R33 was enamored by the discussions centering on what organizational "vision and goals are, and how those statements should be ingrained in all aspects of education." Respondent 28 stated,

> it challenged me to really think differently than I had on similar assignments in the past – to not only address the nuts and bolts, but also to look at things I typically didn't concern myself with, like organizational challenges, political and cultural aspects.

The Staff and Student Centered Aspects class focused on student privacy issues as well as the maintenance, transmission, and destruction of student records. Respondents 15 and 22 gained a better understanding through "discussions and debates related to state and federal data

access and retention" and "found it quite interesting to learn that an email containing a student's name constitutes a student record." Respondent 28 expressed the need "to have a conversation with our Purchasing Agent (who handles contracts) and ask her to be on the lookout for contracts that involve sharing student data" to allow for detail on what information will be shared, how information will be used, and how it can be securely transmitted. Respondent 33 summed up class by stating, "I now have a marketable understanding of what records are, how they factor into my role as the Director of Technology and how I can do my best to protect myself and the District from problems stemming from records."

Leadership and Strategic Planning were the subjects discussed on day 2 of the program introduction and kick-off session. Candidates were charged to identify areas of growth and to develop and individual growth plan to address areas of need. Candidate reflections from this class include:

- "I learned the importance of goal setting for personal and professional growth" (R20).
- "I needed to develop a better tool kit to communicate with district management and improve my ability to position the district for change" and I needed to review my strengths, improve outreach to clients, and become a voice for change" (R15).
- "My initial response to this was that of discouragement because I felt my lack of managerial experience would prevent me from getting the most of the CTO Mentor Program. My attitude began to change once I understood the sessions' goal of providing me the tools in developing leadership skills" (R22).
- "This class made me realize that I need to constantly work at being a better administrator and that the constant growth will never end" (R33).

Candidates indicated a better understanding of several other areas as a result of participating in the CTO Mentor classes:

- *Finance Centered Aspects/Fiscal Management*
    - "I utilized knowledge that was received during the class session to adjust and change my budget" (R33).
    - "Before the session I felt I had a good handle on the overall budgeting process, but I felt weak on the different types of funding, especially restricted funds like categorical" (R28).
    - "As I reflect on this assignment I now have a better understanding of TCO (Total Cost of Ownership) and have added this to my thought process when making technology purchases" (R30).
- *Personnel Management*
    - "At the management level, a CTO becomes more involved with managing staff and less with managing technology. This is a crucial skill for any manager as the progressive discipline process is used to help correct problem behavior" (R31).
    - "It is important to be on top of employee issues and to make sure to take prompt notes, both for negative issues but also for positive notes that can be revisited for evaluations" (R28).
    - "I need to review my own vision and ethics and set my own compass for employee behavior. I need to lead by example to ensure that I am not sending mixed messages to staff" (R15).

- *Educational Technology*
    - "As I have not had any experience in the high school realm of education, I had no idea what the UC A-G, Doorways, or what CLRN [California Learning Resource Network] was. Additionally, I had to think about a lot of areas of education that I had never even considered before" (R33).
    - "Now that I have seen more of the Common Core requirements, I see a great potential for a CTO to refocus our department vision to the classroom" (R31).
    - "As stated in this class, technology is no longer a separate silo. It is pervasive and needs to be a part of every discussion. I have resolved to make an effort to put myself into those conversations instead of waiting for the issues to come to me" (R28).

Essential skills. Through the course of the study, candidates commented on what they perceived to be the essential skills of a CTO. The comments can be categorized into similar strands as presented by CoSN in Chapter Two. In the area of leadership and vision, candidates felt that a CTO must possess effective communication skills in order to present projects and plans to multiple stakeholder groups. Respondent 31 felt that it is important for a CTO to "learn quickly" when getting up to speed on major issues or new solutions being implemented.

Regarding planning and budgeting, candidates felt that it is essential for a CTO to possess strong knowledge of standard school budgeting cycles as well as an awareness of how they intersect with other funding cycles, such as E-Rate. However, respondent 19 felt that when "all is said and done…while a CTO is not an accountant, it is important to maintain the operational budget within the limits set by the District."

Team building and staffing are important areas in which a CTO must excel. Respondent 20 stated that it is essential for the CTO "to be able to build and manage effective teams" as it is critical that the "feedback provided should give direction, guidance, and a means to measure success." Along those same lines, respondent 31 felt that the CTO should "become more involved with managing staff and less with managing technology."

Finally, a CTO must possess "knowledge of the many areas of technology, from routers to switches, fiber cable to patch cables, servers to laptops" (R24) while facilitating change. CTOs need "to participate in the building and maintaining the organization's technology plan" (R15). Respondent 25 stated, "It is the true test of a CTOs leadership skill to lead the change on the tech plan, to pull together the right people, and to inspire them to create a plan with value instead of just meeting the basic requirements to obtain funding."

Year end – Confidence growing. The final reflective artifact in each portfolio discussed the changes in the candidate from the kickoff session, where individual development plans (IDP) were created based on preliminary assessments, to the final session where candidates reviewed their original plans and identified their actual growth. The overarching theme of confidence rang clear. Respondent 33 commented that while putting together their final presentation they would "sit and pontificate upon the ways that I had grown in each strand and how I used each resource to try and reach my IDP goals." Several candidates stated that the CTO Mentor Program (and the IDP specifically) encouraged them to make improvements in specific areas that help them to become a managers and leaders. Candidates reflected on their growing confidence, as well as their growing sense of contribution to the organization and the people around them. Respondent 22's final reflection stated, "During this, the final session of the CTO Mentor Program, I was

inspired in hearing the testimonies of my colleagues and how their plans and the program changed them. I felt I had grown also."

Relationship to Kirkpatrick's levels of evaluation and adult learning theory. Survey question 14 (a, b, h, i, k, l) spoke to Kirkpatrick's level one evaluation, *reaction,* which measures the attendee's perception of the training's efficacy. Survey question 14 (c, d, e, f, g, j, m, n, o) supported adult learning theory by measuring the respondents' prior knowledge, readiness to learn, and whether the program meets their career goals. Please see Table 4 for detailed response data to survey question 14.

According to Kirkpatrick's level one (reaction), the training program must be enjoyable, interesting, and motivating to those in attendance in order for them to achieve the most benefit. The physical environment must be conducive to learning and comfortable for the learners in order for the experience to be enjoyable. Eighty percent of the respondents answered positively that the facilities and equipment were favorable to learning (14i), whereas 17% had no opinion and 4% disagreed that the facilities and equipment were favorable. Ninety-five percent of the respondents were satisfied with the instructors (14b) and 97% of the respondents were satisfied with the course of study (14f).

Adult learning theory states that adults need to be responsible for their learning and that they come ready to learn what they perceive will help with their current situation. Adults are task centered, life centered, or problem centered, depending on their current situation. Survey responses clearly indicated that candidates possessed the prerequisite knowledge and skills for the course (14e), they were able to take the course when they needed it (14n), their knowledge and/or skills increased as a result of the course (14a), and the knowledge and/or skills were

directly applicable to the their job (14c). However, only 58% of the survey respondents felt like they had an opportunity to give input into the course content or design (14o).

Kirkpatrick's level two measures the knowledge acquired, skills improved, or attitudes changed as a result of the training. Ninety-five percent of the survey respondents agreed that their knowledge and/or skills increased as a result of this course (14a). Qualitative evidence presented indicated that candidates experienced increased communication skills, increased confidence, and a better understanding of the educational organization.

Research question 2. Research question 2 asked, To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant an effective means of mastering the program's learning objectives? The researcher will present the quantitative data from survey questions 16 and 17 which relate to research question 2. Secondly, the researcher will present the data from the open ended responses to survey question 17. Finally, the researcher will provide the qualitative artifact data from online portfolios coded using the following: *helpful class activities* and *professional learning communities*.

Quantitative data from the survey supporting RQ2. Research question 2 asked, "To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant an effective means of mastering the program's learning objectives?" Table 5 displays the descriptive statistics for survey item 16 pertaining to the relevance of the program elements in mastering the program's learning objectives. These items were rated using a 3-point Likert scale (1 = Very Relevant, 2 = Some relevance, 3 = No relevance). The highest relevance was achieved for *program content* (82%), whereas least relevant was achieved for *program executive summary* at 43%.

Table 5

Survey Items (Question 16) Pertaining to RQ2 Sorted by Highest Level of Agreement

Survey Items	Very Relevant	Somewhat Relevant	Not Relevant	Skipped Question	Mean	Standard Deviation
Program Content	28	5	0	8	10.25	4.57
Group (Class Discussion)	28	6	0	7	10.25	4.61
Skill exercises (Scenarios, Role Play, etc.)	25	9	0	7	10.25	3.71
Small Team Discussion	25	9	0	7	10.25	3.71
Final Presentation	20	13	0	8	10.25	2.36
Mentor Relationship	19	14	1	7	10.25	2.07
Program Executive Summary	15	19	0	7	10.25	1.88
CCTO PLC	17	13	0	11	10.25	1.72
Portfolio/Final Project	16	15	0	10	10.25	1.72

Note. $N = 41$

Question 17 asked respondents if they "have used the written materials and/or class materials since their participation in the CTO Mentor Program." The majority of respondents (64%) answered *Yes*, with eight percent stating *No*, they had not used the materials. Six percent of the respondents stated the question was not applicable (NA).

Qualitative survey results supporting RQ2. Research question 2 asked, "To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant an effective means of mastering the program's learning objectives?" This section will summarize the responses regarding why they have or haven't used the materials presented during the CTO Mentor Program. There were eight responses to this question, with six respondents indicating that they have used the materials from class. Respondents commented that they used the FRISK personnel management program (Fact, Rule, Impact, Suggestions, and Knowledge) to modify employee behavior. However, most comments were generic in nature. Respondent 4 stated, "I've referenced things learned in class continuously on the job from project management to managing personnel to the evolution of my departments design to presentation methods and

more." Respondent 5 stated that he/she "refer[s] continuously to articles and other materials that were delivered as part of the course content. Project management templates, leadership articles, Cobit/ITIL standards have been among the most useful." The two respondents (R30 and R37) indicated that they haven't been using the material; R30 asserted that this was due to his/her role as mentor and R37 stated that it was due to still being in the program.

Qualitative artifact data supporting RQ2. Research question 2 asked, "To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant an effective means of mastering the program's learning objectives?" To answer this question the researcher summarized the main themes gleaned from the reflective artifacts created by the candidates during their program participation. The qualitative artifact data was coded using the following: *helpful class activities* and *professional learning communities*.

Helpful class activities. Candidates participated in 91 hours of classroom instruction during the 8-month long CTO Mentor Program. In their reflective writings, CTO Candidates spoke often of the relevance of the material presented during the class, commenting on the usefulness of the tools presented and how "the live demos and videos presented have given [them] a much clearer understanding" (R31) of the class topic. Comments regarding the specific class session information learned indicate that candidates found the course content to be highly relevant to adult learners as indicated by statements such as: "this session was excellent and this session helped a lot" (R32), "this class was good exposure for me to get a better understanding of these systems" (R31), "I learned a great deal in this session," (R26) and "this class couldn't have come at a better time" (R26).

Regarding specific activities utilized during instruction, artifact creation was cited often as evidence of learning. Candidates commented that as a result of the activities completed in

class and artifacts created for the portfolio, change was created in their organization. Examples include:

- "The knowledge gained in putting together this artifact has helped me tremendously when speaking about this topic with my supervisor" (R22).
- "I began to notice that the skills I was learning during the course were immediately applicable to the workplace" (R28).
- "I have currently accomplished either reading the full books or extracting relevant points from them to use in my daily work" (R19).
- "This class made me go back and document the network using some network diagramming software" (R19).
- "The process of putting together the RFP (Request for Proposal) was very valuable since this is one of the key areas that a CTO would be responsible for when purchasing new software or hardware systems for the school district" (R24).
- "This exercise showed me that a FRISK write up can be beneficial to the employee, provided it is presented correctly" (R19).
- "The CTO Mentor Program gave me the opportunity to present in a more formal manner" (R17).
- "The class allowed me to review the need to update our AUP [Acceptable Use Policy] and also find the board policies that need updating" (R19).

The CTO position in an educational agency is often a lonely job, as few leaders in an organization fully understand the complexity of a system of systems. One comment from respondent 17 addressed this feeling of loneliness; "both of these groups helped me with the isolation that I felt as the only technology elective teacher on my campus." Respondent 32

remarked that the "large group discussions were very enlightening" and that "facilitating discussions was a great opportunity to practice leadership skills." Candidates commented that having a group focus made the work far more meaningful, as team members can lead with their strengths and develop their perceived weaknesses by working with others. Discussions during class would serve as reminders to the candidates that projects needed to get started, such as creating a new technology plan, and sharing time would provide opportunities to learn other approaches to accomplishing goals. Respondent 32 commented that the "collegial level conversation that occurred during group based and team activities was evidence of true collaboration."

Professional learning communities. The CTO Mentor kickoff session focused on ice breaking and team building activities that focused on developing and understanding Professional Learning Communities (PLCs). Many candidates had never participated in a PLC, and respondent 24 learned that a PLC "was a group of people working cooperatively together toward a shared vision with common goals." Respondent 32 commented after the first weekend, "I believe on the continuum of PLCs, we were at the 'developing stage' for a shared vision and 'initiation stage' for developing our goals."

Although some candidates indicated that "prior to attending this class I had very little contact with a PLC" (R33), others commented that "upon completing this class discussion regarding Professional Learning Communities, I realized that I already have been active in a number of PLCs" (R30). The following comments clearly indicate that the network created through the cohort and CCTO member PLC provides a support system for candidates: "I learned so much being a part of this group" (R20), "the collaborative effort to bring our AUP up-to-date was amazing"(R20), "through this PLC I had become rather comfortable with the idea and even

felt invigorated to attempt the automated feat" (R33), and "this group, along with the CETPA listserv, has been a very valuable resource to help me look at the bigger picture and get exposure to ideas that I would have missed otherwise"(R28).

Research question 3. Research question 3 asked, To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance? First, the researcher will present the quantitative data from survey question 15, which relates to research question three. Secondly, the researcher will present the qualitative data from survey questions 19 and 20, which produced the following themes: *learning-transfer* and *results – organizational impact.* The researcher will then present the qualitative artifact data regarding the relevance of the specific learning outcomes from the candidate portfolios. Finally, the researcher will discuss the results in relationship to Kirkpatrick's evaluation levels.

Quantitative data from the survey supporting RQ3. Question 15 asked survey participants to "indicate the extent to which you think your application of knowledge, skills, and behavior learned from the CTO Mentor Program had a positive influence on the following business measures in your own work or your work unit." Contained within this question are eight sub questions rated on a 5-point Likert scale (1 = *To a very great extent* to 5 = *Not at all*).

Table 6 displays the descriptive statistics for survey items pertaining to the candidates' perception that the learning objectives were relevant to their on the job performance. All items were met with agreement, with candidates feeling that they used the knowledge/skills prior to entering the class to a moderate extent. However, after attending the CTO Mentor Program, candidates indicated that they used the information and materials to a great extent.

Table 6

Question 15: Qualitative Responses

Sub Questions	To a very great extent	To a great extent	To a moderate extent	To a small extent	Not at All	Mean	Standard Deviation
To what extent did you use the knowledge and/or skills prior to attending this course?	4	10	24	2	0	8	3.23
To what extent have you had the opportunity to use the knowledge and/or skills presented in this course?	11	17	10	2	0	8	2.32
To what extent have you actually used the knowledge and/or skills presented in this course, after completing the course?	11	22	6	1	0	8	2.99
To what extent has your confidence in using the knowledge and/or skills increased as a result of this course?	15	18	6	2	0	8.2	2.65
To what extent did you receive the assistance necessary in preparing you for this course?	5	15	15	3	1	7.8	2.24
To what extent has the content of this course accurately reflected what happens on the job?	7	24	8	1	0	8	3.21
To what extent have you had access to the necessary resources (e.g., equipment and information) to apply the knowledge and/or skills on your job?	6	26	6	1	1	8	3.46
To what extent have you received help, through mentoring and/or feedback, with applying the knowledge and/or skills on the job?	10	16	9	5	0	8	1.99

Note. $N = 41$

Question 19 asked, "Do you think the CTO Mentor Program represented a good investment for your organization?" and yielded both quantitative and qualitative responses. Thirty-five respondents answered the question, with 28 (80%) in the affirmative and seven respondents offering a qualitative explanation. Respondent 24 stated clearly that "the skills learned are not being utilized by my organization," explaining that this was due to the candidate being second in command for the IT department. Two respondents (R14 and R22) commented that while the program yielded benefits for the organization, the candidates had paid the tuition themselves, with the district allowing them to claim the days off as work time. Two respondents felt that "the program yielded great benefits for my organization" (R1) by "investing in my professional growth and expanding my understanding of organizational behavior" (R7).

Respondent 39 felt that the "program is a steal at the current price given the length and breadth of the class."

Qualitative data from the survey supporting RQ3. Research question 3 asked, To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance? This section will summarize the main themes from respondents' answers to the open-ended survey questions, 19 and 20. Results of question 19, "How has your organization benefitted from your participation in the program" and question 20, "What additional benefits have your organization derived from this program?" produced the following themes: *learning-transfer* and *results – organizational impact*.

Learning-transfer. Learning-transfer is evidence that what was learned is actually being used in the job for which it was intended (Olsen, 1998). Respondent 1 was very specific regarding this theme, stating that "as a result of the Business-Finance class and learning about K12 finance, TCO, and ROI, I have brought numerous projects in on time and under budget, along with how to sell projects to my organizations upper management team." Two candidates commented that "this course has given me the opportunity to be guided through activities that I would not normally be exposed to" (R39) by providing "access to best practices and focus on systems thinking that was emphasize so consistently in the program" (R4). Respondent 5 commented that because of the program, he/she has "focused hiring on work ethics and attitude and invested more in technical training to get the right people on the bus."

Several comments alluded to learning-transfer through increased knowledge and connections and by being "more aware of all of the ways my team and I serve the district as a whole" (R18), or "another well trained and informed leader in the organization" (R2).

Respondent 12 stated, “my position as CTO has become far more embedded within the structure of the district and I regularly provide guidance and leadership to administration and staff.”

Results – Organizational impact. Respondents were very specific in their examples of how the organization itself was impacted due to their participation in the CTO Mentor Program: respondent 40 stated “Improvements in IT support services (helpdesk operations and school site support)” and other respondents noted that “improved processes in our IT department” (R30) have “greatly improved the outside perception of the Information Services team” (R6). Several respondents commented on the “improved processes within the district” (R20, R30, R33, R41), as well as “board policy and network security updates” (R41), which resulted in “increased customer satisfaction for both internal and external customers, improved business processes through the analysis and streamlining of system, and decreased costs due to the consolidation of redundant systems” (R8).

Respondent 4 stated that the organization has benefitted “through greater access to best practices and my own focus on systems thinking. We are now more organized, more nimble, and more efficient.” Respondent 39 stated that

> any organization that has staff that has been through the program will see benefits in terms of improved communication, a better understanding of school activities beyond the confines of a technology centric view, improved management approaches, improved efficiencies and a better understanding of what is required.

Qualitative artifact data supporting research question 3. Research question 3 asked, To what extent do CETPA CTO graduates perceive the program’s learning objectives to be relevant to their on the job performance? The researcher will present data drawn from candidates’ reflective artifacts that summarize the main theme, *relevant learning outcomes.* This data will be presented in the same chronological order in which classes are presented to the candidates during the CTO Mentor Program. Candidates attend class once a month for 8 months; each class lasts

for one Friday evening and all day the immediately following Saturday. Typically, two different topics are presented over the span of 2 two days, with the exception of Finance Management.

The CTO Mentor Program curriculum consists of 14 topics grouped into three strands. One hundred thirty-five 135 learning outcomes guide the curriculum; however, candidates are required to address 25 learning outcomes for their portfolio (see Table 7 for details). Learning outcomes are defined as: *Exposure*, the ability to understand general concept without necessarily relating it to anything else; *Familiarization,* the ability to retain specific details about the topic; *Working Knowledge*, the ability to recall the concept, process or technique without fully understanding how to use it- requires more detailed information; and *Application*, the ability to demonstrate the use of the concept, process, or technique (CETPA, 2013).

Table 7

Topics, Strands, and Learning Outcomes for the CTO Mentor Program

Topic	Strand	Total Learning Outcome	Required Learning Outcome
Leadership and Strategic Planning	Leadership	14	2
Professional Development	Leadership, Education	8	1
Project Management	Leadership	5	1
Technology Infrastructure and Data Systems	Technology	12	1
Organizational Management	Leadership, Education	11	2
Fiscal Management and Finance Centered Aspects	Leadership, Education	8	2
Security Fundamentals	Technology	8	2
Assessment and Accountability	Education	6	3
Technology Policies, Standards and Plans	Technology	11	2
Educational Technology	Education	12	3
Staff and Student Centered Aspects	Education	13	4
Strategic Leadership	Leadership	14	1

To achieve CCTO status, candidates must create an online portfolio demonstrating knowledge gained during the course of study. Candidates create artifacts to support the learning outcomes and then write a reflective essay stating how the learning and the process of artifact creation affected their own leadership growth, including any changes that may have happened in

their organization. Evidence for the 14 topics is presented in chronological order as they are presented to the candidate during coursework. In some cases, portfolio artifacts and reflections may not have been created in the same sequence.

Relevant learning outcome – Leadership and strategic planning. The first meeting of each cohort begins with the program introduction. Eleven of the 15 portfolios described the learning outcome from the program kickoff as relevant to their leadership development. The course content included an overview of the program and the expectations for participation, ice breaking, and team building activities. The required outcome for the portfolio states that the candidate must "demonstrate the ability to effectively participate as a member of a PLC through reflective dialogue, continuous inquiry, collaboration and/or de-privatization" (CETPA CTO Manual, 2013, p. 6).

Several candidates came to the table with PLC experience due to their background in education; respondent 32 stated that "while there was no new information, I enjoyed the refresher." Respondent 22 observed that the "knowledge [gained from class] helped me understand how these PLCs depend on the timeliness and accuracy of the reports I develop in my current position." Respondent 28 commented that the CTO cohort, "along with the [CETPA] listserv, has been a valuable resource to help me look at the bigger picture and get exposure to ideas that I would missed otherwise." Often candidates leave a class inspired to take what they have learned to another level. Once such candidate (R33) commented that "after leaving this session I had felt that, in my regional area, the technology communities had been missing an integral part of learning and had given me insight to develop a PLC," while another candidate (R18) stated, "when I returned to my district I actively sought out district PLCs to be part of." The first session was summarized very well by the following portfolio comment:

> The program induction and kickoff event for the CTO mentorship provided me with the opportunity to see an overview of the entire program, set a vision for leadership, meet with my mentor for the first time and review our prerequisite assignments on the topic of Professional Learning Communities. (R30)

The Leadership and Strategic Planning learning outcome provided the candidates an opportunity to self-assess their educational success factors utilizing the Microsoft Competency Wheel by asking candidates to "demonstrate the ability to identify areas of growth and to develop an individual growth plan to address those areas over time" (CETPA, 2013, p.7). The "education competencies represent many of the attributes, behaviors, areas of knowledge, skills, and abilities required for successful job performances in education" (Microsoft in Education, n.d., p. 2). After reviewing the Microsoft competencies, candidates chose three areas on which to focus during the CTO Mentor Program.

Adult learners bring prior knowledge and experience to their learning and oftentimes negative feelings and emotions can reappear as a result. Respondent 22 commented that his/her "initial response was of discouragement" due to his/her perceived lack of managerial experience, which he/she felt "would prevent me from getting the most out of the CTO program." Another candidate (R32) stated that his/her "challenges with writing have haunted me in college and career for 25 years. I really want to get better at writing." However, many candidates were able to identify areas of growth potential without expressing fear or anxiety. One candidate stated that he/she "needed to develop a better toolkit to communicate with district management and improve my ability to position districts for change" (R15). Respondent 33 commented, "[I chose] the Motivating Others item from the wheel…and have consistently tried to improve myself in that area."

Candidates will often change their choices after spending more time in class. Once such candidate, respondent 28, stated that as he/she

> progressed through the class I decided to replace Motivating Others with Time Management as I feel that is an area that I can benefit from immediately as I continue to balance my class work, home life, and a number of very large projects that have come up after beginning the program.

Included in the Leadership and Strategic Planning class is the reading of *Good to Great* by Jim Collins (2001). Respondent 16 commented that "learning about the five levels of leadership from Jim Collins' *Good to Great* helped me put into perspective where I stand in my journey to developing these skills." At the end of day 2, candidates commented that they "learned that leaders know which departments they need to work with for different tasks, requiring good relationships" (R22) and that it is "important to value the role each person plays on the team and to always maintain the vision of empowering teachers to help students with college, career, and citizenship" (R30).

Relevant learning outcomes – Professional development and educational technology. Professional Development and Educational Technology were the topics for the second session of the 2014CTO Mentor Program. The professional development learning outcome requires candidates to "demonstrate a working knowledge of how to determine need, plan, design, and customize professional development for specific audiences" (CETPA, 2013, p. 7). Candidate comments ran the gamut from "I rarely lead professional development training sessions" (R30) to "it was very rewarding to take something from the CTO Mentor Program and immediately begin to develop strategies about the ways I could use the information to improve professional development opportunities" (R15). Respondent 33 claimed that "the professional development class has, so far, been the class in which I have learned the most." Commenting on the course content specifically, Respondent 24 stated:

> During the PD [professional development] session I learned about the PD Sandwich Concept (tell them what they are going to learn, teach them, and then review by telling

> them what they learned). Also I learned that adults are more autonomous in their learning and need to know the goals and relevance when learning.

Candidate (R24) further commented that "we learned about the key components of a good professional development training opportunity – such as creating a compelling flyer or recruitment information, analyzing audience need, and soliciting feedback." A third candidate (R21) stated that he/she "garnered a lot of insight about PD best practices, including the importance of PD as a business continuity strategy (mitigating the 'critical staff member gets hit by a bus or wins the lottery tomorrow' risk)."

After the class, respondent 28 commented that as he/she had "thought back on the previous PD sessions given and in retrospect, I think they were bad." However, as a result of the learning in class, and following the guidelines provided, the same candidate commented that "these sessions were a success largely due to the lessons and strategies I learned in class." Two additional candidates shared how the have used the knowledge gained from the professional development session:

- "Currently I am working on professional development planning for our principals on best practices for using the district's assessment reporting tools. I expect this professional development to be successful by utilizing…the template in its entirety" (R22).
- "This class showed me the importance of ensuring that all teachers have received the necessary professional development to successfully integrate technology into their curriculum. Since then the IT and Education departments have partnered and are working together to enhance curriculum with technology" (R26).

The Educational Technology topic is one of three topics to experience change over the last 3 cohort years. For the cohort years 2012 and 2013, candidates were required to speak to

four learning outcomes in their portfolio artifacts, requiring candidates to demonstrate a working knowledge of:

- NETS (National Educational Technology Standards);
- 21st Century Skills framework as defined by ISTE's Route 21 Resource;
- The importance of the support, management and operations of technology through policies, guidelines, and planning; and
- The social, legal, and ethical issues regarding classroom technology (CETPA, 2013).

Due to the changing landscape of K12 education and the shift to the CCSS and online testing, the learning outcomes for the Educational Technology topic were modified beginning with the 2014 cohort. The learning outcomes were reduced to three (from the previous four), requiring candidates to address their familiarity with:

- The CCSS that require technology ability;
- A variety of technology, tools, devices, and resources that can be used by the teacher to accomplish the Common Core Standards; and
- Online learning environments, A-G requirements, learning management needs of online environments and the International Association for K-12 online learning (iNACOL) standards for online teaching (CETPA, 2013).

A candidate from the 2012 and 2013 cohorts commented that

> one of the reasons I chose to apply for the CTO program was the new content I would have the opportunity to utilize in my current position and positions in the future. Educational technology has been an area that I have little previous experience. (R15)

Another candidate (R28) stated that:

> going into the class I wasn't really sure what to expect. I assumed it would focus on the use of technology with the classrooms, differing learning strategies, and things that, while good to know, didn't seem particularly relevant to me. I was please to find that wasn't the case and the session was very enjoyable and informative.

A third candidate (R17) commented that the educational technology class "was one of my favorites."

Exposure to the 21st Century Framework, ISTE's NETS, and the 2012 Horizon report was the focus of candidate comments for the 2012 and 2013 cohorts. Exposure to the 21st Century Framework had one candidate comment that while "I don't have all of the knowledge at this time I do have a better understanding of the framework to promote the concepts and become an active participant in the conversations" (R15). Exposure to the ISTE NETS for administrators through a prerequisite assignment "forced me to take a hard look both at myself and the district and I recognized many glaring shortcomings" (R28). A final comment referenced the 2012 Horizon Report, a bi-annual report from New Media Consortium, which reports on the key trends, significant challenges, and important developments in educational technology covering a 5-year period. After reading the Horizon Report, the candidate (R17) commented that "the program has taught me that one of my main roles in being a CTO is facilitating change. Technology evolves quickly and a CTO needs to be aware of what the next trend will be."

In 2014, CTO Mentor candidates were presented with the information required for the 2012 and 2013 cohorts, but were required to address the new learning outcomes that focused on the CCSS and online learning environments, including standards for online teaching. As one candidate (R32) stated, "there was ample exposure to Common Core resources and time to discuss how Common Core will impact technology departments."

Two different viewpoints came out of the same cohort. The first candidate (R33) focused on the one-time state CCSS funding distributed to all districts, based on average daily attendance, stating, "I had heard about the one time monies that related to the common core standards, but I was completely in the dark on what percentage and how much my department

was going to receive." The candidate further explained that, as a result of the "discussion we had in class," he/she was provided an opportunity to have a lengthy discussion with the Assistant Superintendent and Superintendent to find "ways to effectively utilize these funds." The second candidate, respondent 30, focused on the curricular aspects of the common core, acknowledging his/her prior educational background as providing a working knowledge of the CCSS and stating that "it was suggested that IT professionals need a general background regarding the standards by looking for the verbs, memorization of a few standards, and to have a basic two minute elevator speech on the topic. I will use these recommendations."

Two candidates (R31 and R33) commented that they had not been involved in any curriculum planning before, "nor was there experience with high school," therefore they had "no idea what the UC [University of California] A-G requirements, Doorways, or what CLRN was." As a result of attending the class, one candidate (R14) stated, "I have a new appreciation for what staff undergoes when attempting to find online courses that meet the A-G and possible NCAA and other sports requirements. It is daunting to say the least." Respondent 33 stated, "I had to think about a lot of areas of education I had never even considered before" while choosing to focus an artifact on the learning outcome that addressed online education. This respondent stated that the artifact creation raised his/her awareness that "not all online courses are created equal."

Relevant learning outcome – Fiscal management and finance centered aspects. Fiscal Management and Finance Centered Aspects was the focus for the third month of the CTO Mentor Program. The learning objectives required candidates to demonstrate a working knowledge of budgeting, budget controls, the K12 budgeting calendar, and of management accounting. Candidates commented that this session was useful: "This session was very helpful

in shedding some light on these funding areas where I have had little exposure in the past" (R22); "The Fiscal Management and Finance Centered Aspects session was very interesting to me as all of this information as new and I had several questions" (R22); "the class time was definitely time well spent for me in my new position" (R30); and finally, "this class couldn't have come at a better time" (R26).

Candidates provided insight into their learning as it related specifically to the budget creation artifact required for this topic:

- "Over the course of the 2 days on finance and budget I learned how important it is to get to know your Chief Business Officer. I also learned a lot about state and local funding and was introduced to the new Local Control Funding Formula (LCFF) that will come into play in the 2013-14 school year and will fundamentally change how many programs are funded. Not having much experience with budgets, learning about the Standardized Account Code Structure (SACS) was very helpful" (R20).
- "My responsibilities within my organization did not include the area of budgeting and our overall financial profile within the organization. More recently I was included in budget planning and the budget calendar for my organization. With the expectation that I will have more responsibilities related to our department budget, I focused on building knowledge of Management Accounting and the budget calendar and controls" (R15).
- "I utilized knowledge that was received during the class session to adjust and change my budget. I incorporated information from the SACS portion of the class to make sure that my funds were coming out of the correct sections" (R33).

The second artifact for the fiscal topic required candidates to write a Total Cost of Ownership

(TCO) analysis for an impending project. The required elements of the TCO analysis included an introduction, executive summary, background of the project, identified challenges and risks, options, budget, and recommendations for moving forward. Respondent 22 stated that "the TCO process provides an organized and objective framework through which I was able to develop a more complete picture of both the cost and the potential business value of the project." Respondent 20 commented that he/she "found this activity to be quite useful" and that "taking the time to craft a TCO and ROI analysis can support effective decision making when it comes to new acquisitions as well as in transitioning to new models of delivery." Respondent 31 noted that "this artifact is the result of over 6 months of product research and has been distributed to our CBO for review."

Relevant learning outcome – Security fundamentals and organizational management. The fourth class focused on the topics of security fundamentals and organizational management. The security fundamentals learning outcomes required candidates to have a working knowledge of one or more tools used in network security and to demonstrate the ability to apply what has been learned about available tools to improve network security. Candidates commented that the class was enjoyable "in particular because of the focus on network security and the opportunities to apply real tools to real life scenarios" (R32). The artifact for this learning outcome required candidates to run a security scan of their district networks and was, as one candidate stated, "very eye opening" (R31). As a result of the artifact creation and scans performed, candidates "found there are many areas of vulnerability" (R26) and went back to their teams who were "going to conduct further investigation into the risks" (R30) and "begin the planning process for a more secure network for our K12 environment" (R26).

The Organizational Management topic is the second of the three topics to experience change over the 3 cohort years. For cohort years 2012 and 2013 candidates were required to:

- Demonstrate familiarity with the need for IT process control and the tools and documentation needed for success;
- Demonstrate a working knowledge of what policies and procedures are required to adequately document and control the activities of an IT organization; and
- Demonstrate the ability to apply knowledge of the COBIT (Control Objectives for Information Related Technology) system for control and assessment of IT processes.

The candidates for the 2012 and 2013 cohorts were required to complete an online COBIT self-assessment for their portfolio artifact. Respondent 28 commented that "the session and the corresponding artifact were extremely challenging for me" and further stated that he/she was left "reeling by the sheer volume of information – RACI [Responsible, Accountable, Supportive, Consulted, Informed] chats, SWOT [Strengths, Weaknesses, Opportunities, and Threats], essential skills, SPELIT [Social, Political, Economic, Legal, Intercultural, and technological] Environment analysis, data governance, ITIL [Information Technology Infrastructure Library], COBIT [Control Objectives for Information and Related Technology]– so much to digest!"

The COBIT self-assessment had one candidate (R19) coming to the "realization that this should not be done by a single person, but a whole department or even an oversight committee for the entire organization." Respondent 19 further commented that "there is much to the whole structure that I am afraid most K-12 education does not or cannot follow due to resources needed to accomplish compliance." Respondent 17 asserted that "the COBIT assignment was difficult for me since I was so new to the IT department and the CTO had only been here 1 year." After conducting the COBIT assessment, candidates "found that the technology department [the

candidates'] was more reactive than proactive" (R15) and that the session and artifact were found to be "challenging because they were specifically addressing areas of weakness, which is exactly what I was looking to get out of this program" (R28).

In 2013, the learning outcomes remained the same as 2012; however, a new artifact requirement was added for candidates. Due to the impending Smarter Balanced Assessment (SBA) field test, candidates were required to write an executive summary that served "as a conversation guide to cabinet level personnel for planning and implementing the CCSS and the Smarter Balanced Assessment" (R20). Candidates were introduced to the SPELIT (Social, Political, Emotional, Legal, Intercultural and Technological), RACI (Responsible, Accountable, Consulted, and Informed), and SWOT (Strengths, Weaknesses, Opportunities, and Strength) matrices in order to better analyze their organizations' preparedness for the CCSS/SBA paradigm shift.

Candidates made the following comments on the effectiveness of these tools:

- "We were asked to use the SPELIT method for evaluating our organization as a means to identify the driving forces and potential roadblocks to implementation. I found the activity to be challenging yet very valuable. Using SPELIT helped me to identify the key drivers within our organization in a way I had not done before" (R20).
- "The introduction of tools like the Critical Success Factors, SPELIT matrix and SWOT analysis helped me clarify the most important items that I believe my district needs to address in order to prepare for the SBAC rollout" (R21).

- "The SPELIT matrix and RACI model assisted me in honing in on the realities of SBAC/CCSS implementation in our district. These two tools helped me to summarize and document the required procedures needed for success" (R22).
- "I felt the RACI matrix was a powerful tool to use and it made a lot more sense to me once I put it to use in my project paper" (R24).

As a result of this class, required artifacts, and exposure to the many tools, candidates returned to their organizations with mixed results. One candidate (R32) commented that "due to the climate in my department, it was a bit uncomfortable to complete the assignment in a truly evaluative manner." Others had a more positive experience, stating that "the knowledge gained in putting together this artifact has helped my tremendously when speaking about this topic with my supervisor and exchanging ideas" (R22) and "taking a closer look at all these components will help me better support and facilitate change from the organizational perspective and not just from a departmental perspective" (R30). Respondent 22 declared that he/she feels "empowered in having gained these new tools which will help me tremendously throughout my career."

Relevant learning outcomes: Technology infrastructure and data systems; project management. Session five of the CTO Mentor Program began with the technology Infrastructure and Data Systems (TID) topic. The learning outcomes for this topic are the third to be modified between the 2013 and the 2014 cohorts. There were 12 learning outcomes for cohorts 2012 and 2013 among which the following were required:

- Demonstrate familiarity with technology infrastructure, including its relationship with facilities;
- Demonstrate a working knowledge of the functionality of an SIS, including attendance, grading, discipline, etc.; and,

- Demonstrate the ability to apply what they have learned about the RFP process to develop the system requirements for an SIS.

The 2014 learning outcomes number 11 with only one require learning outcome, which require the candidate to demonstrate the ability to apply what they have learned about the RFP process to develop the system requirements for an SIS. Respondent 32 commented that he/she "learned a great deal in this session" and that this "course and assignment will serve me well as a CTO." Respondent 31 stated that "since I have had very little interaction with SIS, this class was good exposure for me to get a better understanding of these systems." Respondent 21 noted that "as we started to dig into the topics and discuss network documentation, failover plans, and proper facility environments, my confidence was quickly shaken." However, this same candidate later stated that "the SIS requirement exercise reinforced the importance of collaboration and stakeholder input when drafting specifications for important systems." Respondent 26 appreciated the group focus on the assignment as it "made it far more meaningful" and the "sharing time gave me an opportunity to view other candidates' infrastructure diagrams." Candidates shared how this session has affected their work:

- "This class forced me to familiarize myself with our processes and procedures in regards to attendance and database management" (R26).
- "The experience as a whole brought upon me an awareness to the importance of protecting the network and data center in order to minimize the impact of system failures" (R22).
- "Since this session I have made an effort to check in regularly with our facilities leadership just to see how things are going with our current projects" (R28).

Two final observations were made by candidates regarding the efficacy of the topic:

- "This class was an excellent reminder of all of the intricacies that must be taken into consideration when implementing or changing a globally used resource" (R19).
- "The process of putting together the RFP was very valuable since this is one of the key areas that a CTO would be responsible for" (R24).

Day 2 of the fifth session introduced the Project Management topic. It is important to note that the Project Management topic did not require artifacts or reflections for the 2012 and 2013 cohort years. The project management learning outcome was added as a requirement to the portfolio due to the impending high stakes testing that public schools were about to field test. The learning outcome for project management requires candidates to demonstrate the ability to apply Project Management Initiation and planning tools to gain board approval to implement a technology project. The four candidates representing the 2014 cohort provided the following comments regarding their learning experience:

- "I feel that this class has enhanced my knowledge of project management and will lead me to implement many more successful projects and have a wider scope of understanding of how projects function in the public education sector" (R33).
- "By creating a detailed project plan, a CTO can align organizational vision and resources to ensure a projects' success" (R31).
- "I will be utilizing the templates I was given to craft plans to have my deliverables, measureable milestones and, most importantly, understanding the risks and issues before jumping into a project" (R33).
- "Now that the assignment is complete, I feel that I gained a greater understanding of the process and wish that I had this knowledge with previous projects" (R30).

Relevant learning outcomes: Assessment and accountability. The sixth session of the CTO Mentor Program focused entirely on Assessment and Accountability. The learning outcomes for this session required candidates to:

- Demonstrate a working knowledge of best practices to report achievement data to various stakeholder groups.
- Demonstrate a working knowledge of how districts utilize assessment data to improve achievement for all students.
- Demonstrate the ability to examine their leadership skills related to the CTO's role in using local, state, and federal data to improve teaching, learning and education administration.

Prior to attending this class, Respondent 33 commented that he/she "did not have a full understanding of just how important data is to the success of a school district," nor was he/she "well versed in utilizing student data to make any type of decision." One candidate commented,

> honestly, I was dreading the Assessment and Accountability session. I had visions of statistics, acronyms, and SBA panic attacks as I pulled into the parking lot. Thankfully, I was pleasantly surprised and very relieved when [the instructor] dove right into his central point of using Assessment and Accountability (A&A) to help tell your organization's story. (R21)

Candidates received the learning positively, stating:

- "This session was excellent in outlining the data sets that are fed from local and federal accountability systems, as well as explaining the local and federal assessment systems" (R32).
- "Before this class, I didn't think that student assessments fell under the responsibility of a CTO. I thought this was the responsibility of the teachers, campus administration

and the education department. This class showed me the importance, so I reached out" (R26).

- "This was one of the few classes in the CTO Program that my classmates were glad to have me at their table with my educational background. As a former principal and Director of Elementary Education, assessment and accountability is not a new topic" (R30).
- "The focus on storytelling utilizing data made the class much richer in scope, and maintained its relevance to the CTO program. I was so impressed by the effort made to teach all of us CTOs to understand our data in an effort to become storytellers at the cabinet level" (R32).
- "I plan on using my new understanding of assessment and accountability to inform my contributions to the goal setting process" (R21).

Relevant learning outcomes: Staff and student centered aspects; personnel management. The seventh session of the CTO Mentor Program began with the topic of Staff and Student Centered Aspects. The learning outcomes for this session require candidates to demonstrate the ability to:

- Apply the conditions of records access and release;
- Apply requirements of maintenance, transmission and destruction of records;
- Apply knowledge of student privacy regarding records; and
- Apply knowledge of student record attributes.

Respondent 32 found this class to be "a very useful session," indicating that "was very informative in providing background and information about records management." Respondent 22 "found it quite interesting to learn during the session that an email containing a student's

name constitutes it a student record," while another commented that "I had no idea what the Custodian of Records was. I assumed that it was our human resources person as they deal with records all day long" (R33). Three candidates summed up their learning thusly:

- "After the class I think I came away with a good understanding of the reasons behind records retention, the various records classes, and the systems districts are required to have in place to manage them" (R28).
- "Before this class, I had a very basic understanding of the student records requirements. I was familiar with FERPA and HIPPA requirements. However, I've discovered that student records, while seemingly simple, at times can become a little more complex, especially when dealing with the different classes of records and their disposal criteria" (R24).
- "This class helped me realize the need for policy with respect to student privacy" (R19).

The topic of Personnel Management was covered on day 2 of the seventh session. Candidates were exposed to 13 learning outcomes requiring candidates to demonstrate a working knowledge of recommended practices for the documentation and remediation of unsatisfactory employee performance. Candidates were given the FRISK (Fact, Rule, Impact, Suggestions, and Knowledge) manual, which helps supervisors address personnel issues by using a progressive discipline system. Candidates commented that "this was a useful session as I've had no prior experience with FRISK" (R32) and that "the personnel management class addressed a lot of topics for me" (R33). Respondent 21 was "pleasantly surprised by how engaging and applicable the instruction turned out to be." Respondent 30, who had been in his/her leadership role for a while and was familiar with the FRISK model, stated that he/she has "had to write many

conference summaries and formal letters of reprimand." Another experienced leader (R15) stated that

> with the FRISK information and exercises done in both individual and group settings, I was re-educated that before the need to FRISK for unsatisfactory behavior, I need to proactively monitor and support staff. I need to review my own vision and ethics and set my own compass for employee behavior.

Candidates who had limited to no supervisory responsibilities commented on the relevance of the learning to them:

- "As a teacher the most I've ever come to doing a FRISK write up was giving an afterschool detention. I still have not been put in a situation where I have had to FRISK but I feel that through the assignment and class I will be better prepared when it happens" (R17).
- "I feel learning the FRISK model has given me a valuable tool that will assist me when it eventually becomes necessary to actually go through these steps to document and discipline an employee" (R24).
- "I learned the importance of hiring the right people for the job. The amount of time, energy, and money that was wasted on this employee could have been avoided if the right person were hired" (R26).

Candidates commented that as a result of this class they felt more confident in dealing with personnel issues. A few key take-away thoughts for respondent 22 included consulting "with Human Resources so they are informed and can offer next step suggestions" and "making sure that employee evaluations are done in a timely manner." A final candidate (R33) summarized his/her learning by stating that, "overall, the class was very eye opening as I realized that what I felt I knew about FRISK and what I actually knew about FRISK was really different."

Relevant learning outcomes: Technology policies, standards, and plans; vision and technology leadership. The eighth and final session of the CTO Mentor Program began with the topic of technology policies and technology plans. Learning outcomes for the topic required candidates to demonstrate the ability to apply what was learned regarding policies, procedures, and technology plan requirements and to create or revise a policy and to evaluate an existing technology plan, as well as create a new one. This topic delved into two areas: school board policy and technology plans.

Candidate reflections indicated that this session was "eye-opening and timely" (R26) as districts with expiring technology plans were notified by CTAP (California Technology Assistance Program) that revisions were coming due. Respondent 24 commented that he/she could "see how the outcomes of this class will assist me as a potential CTO to understand why a technology plan is necessary and to know what it contains and also how to write or modify one." The in-class exercise of reviewing an existing technology plan led one candidate to comment that their "lack of experience in participating on a master technology plan committee made it quite difficult to peruse through the artifact and find something that I can genuinely recommend to change" (R22). Another candidate (R21) stated that the "in-class group exercise really made me reconsider my approach for the next round of writing." Respondent 28 commented that "during my time in education I have been involved with writing/updating technology plans four times, and each time it has been a frustrating process." At the conclusion of his/her reflective writing on the tech planning process, Respondent 28 stated that "while I wouldn't say I'm looking forward to it, I do feel the CTO Mentor Program has left me better equipped for the challenge."

The portion of the session spent on board policy was very helpful, according to Respondent 28, in clarifying "the difference between board policy, administrative regulation, and

an actual in-district policy." Another candidate (R18) was "glad" for the exposure to "board policies or I would have never known to look through Gamut [California School Board Association policy repository] for specific policies on technology." Candidates felt that the information provided during the class will allow for the building of "succinct and stout policies" (R33) and reminded candidates that "policy and regulation documents can be extremely powerful tools, useful for organizing and stabilizing the districts technology initiatives" (R21). At the conclusion of the topic, candidates felt "confident with many of the BPs and ARs I've created and/or modified over the years" (R21) and were motivated to "review our existing tech related policies and ensure that they are all up to date, and fill in the gaps where necessary" (R28).

The final session of the CTO Mentor Program required candidates to demonstrate their ability to show professional growth in leadership related to the individual development plan introduced in the kickoff session 8 months earlier. Respondent 22 was "inspired in hearing the testimonies of my colleagues and how their plans and the program changed them." Respondent 17 stated that "the review of the individual development plan was a good way to end the CTO Program." A few candidates shared final thoughts about the CTO Mentor Program experience:

- "Wow! It has been quite the year in the CTO Mentor Program. I have learned so much that I use in my new work environment every week" (R30).
- "Although I have learned so much in this program, I think one of my greatest gains has been in my growth as a professional. I better understand the difference that exists between being a leader versus being a manager. Sometimes you need to be one or the other. Sometimes both. However, the key difference for me is that a leader inspires, teaches, facilitates, and engages in the processes that move people and organizations forward to achieve goals, enact missions, and realize visions" (R20).

- "It is really difficult to sum up the learning that took place during this program. Suffice it to say that it was really well rounded and put a face on much of the experience that I have. I have been in management for 4 of my 16 years in educational technology and have never touched on or reflected upon many of the items presented in this course" (R19).

Relationship to Kirkpatrick's levels of evaluation. Survey question 15 spoke to Kirkpatrick's level three, learning (transfer), which measures the extent to which CTO Mentor candidates change their on the job behavior due to the training. Prior to the training, 9% of participants indicated that they used the knowledge/skills to a very great extent and 24% indicated that they used the knowledge/skills to a great extent. However, following the learning experience, 27% indicated that they now use the knowledge/skills to a very great extent and 53% indicated that they used the knowledge/skills to a great extent. Ninety-five percent of the respondents indicated that they actually used the knowledge and/or skills presented during the course after the course was completed.

Level four of the Kirkpatrick model measures the impact of the training on the organization. In the case of the CTO Mentor Program, this refers to the extent to which the technology leader affects change in the organization as a result of the training. Qualitative data from survey questions 19 and 20, as well as the qualitative data from the candidate portfolios presented previously, clearly demonstrate evidence that organizational change has occurred as a result of the candidate participation in the CTO Mentor Program.

Summary of Themes from the Research

The previous sections have addressed both the quantitative and qualitative data collected which pertains to the research questions aimed at evaluating the CETPA CTO Mentor Program.

Four overarching themes emerged that serve to address the three research questions: applicability, development, transferability, and productivity. These four themes are introduced subsequently and will be further expanded on and related to the literature in Chapter Five.

Applicability. Participating in the CTO Mentor Program is a choice made by technology leaders in K12 educational organizations looking to advance their leadership careers. Relevant curriculum, learning outcomes, activities, and relationships all work in concert to provide an applicable course of study for the aspiring CTO.

Development. Candidates demonstrated personal and professional growth through changed attitudes, improved knowledge, and increased skills as a result of participating in the CTO Mentor Program. Exposure to new perspectives, new information, and an expansive PLC served as the fertilizer that helped the candidates grow.

Transferability. Resulting from their participation in the CTO Mentor Program, their positive attitudes, and their desire for change, candidates were able to transfer what they learned in the program to their workplace. The transfer of the learning indicates a behavior modification that ultimately leads to sustainable change.

Productivity. Candidates indicated through their reflective portfolio artifacts that the new knowledge and skills acquired during the CTO Mentor Program brought about change in their organizations. Examples of these changes include board policy updates, improved network security, improvements in IT support services, and increased communication with stakeholders, among others.

Chapter Five: Discussion, Conclusions, and Recommendations

The purpose of this mixed methods study was to identify the extent to which differences exist before and after candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations. A second purpose of this study was to identify the degree to which CETPA CTO candidates perceived the program's learning activities to be a relevant and effective means of mastering the program's learning objectives. The third purpose of this study was to identify the degree to which CETPA CTO graduates perceived the program's learning activities and objectives were relevant to their on the job performance.

Chapter Five presents a comprehensive summary of the findings from the survey and artifact data and compares it to the relevant literature, provides conclusions based on the findings from the research, describes implications for practice and policy, and suggests recommendations for future research.

The following questions served to focus the research process:

1. To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations?
2. To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives?
3. To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance?

Brief Restatement of Findings

The findings from the qualitative and quantitative data analysis, as reported in Chapter Four, are summarized here. The key findings from Chapter Four include four themes that relate to the theoretical frameworks on which this case study was analyzed. The four emergent themes were: applicability, development, transferability, and productivity.

Applicability. Participating in the CTO Mentor Program is a choice made by technology leaders in K12 educational organizations looking to advance their leadership careers. Relevant curriculum, learning outcomes, activities, and mentor relationships all work in concert to provide an applicable course of study for the aspiring CTO.

The CTO Mentor curriculum has been carefully developed over the years through the combined work of the CTO steering committee, instructors, and mentors. The content is reviewed annually to ensure the relevance to the role of educational technology leadership in California K-12 educational organizations. CTO candidates spoke often about the timeliness and the relevance of the materials and resources presented during the 8-month course of study. The learning outcomes, as defined by the CTO Mentor steering committee, seem to provide a coherent road map guiding candidates in their learning. Candidates indicated through their reflective writing that the varied levels of exposure, familiarization, working knowledge, and application of information presented in class gave them the necessary tools by which to successfully perform their duties. Although the amount of information provided during the CTO Mentor Program was often overwhelming, candidates found the learning to be relevant to the job.

The candidates considered the activities embedded into the face-to-face sessions to be very relevant to their learning. Candidates indicated that most valuable activities were those that

allowed for PLC collaboration in the form of class discussions, small group discussions, role plays, and scenarios. It seems as though the development of relationships, whether through the CCTO PLC or with their assigned mentors, was less relevant than the actual program content; however, the candidates did indicate that these relationships were somewhat relevant.

Development. Candidates demonstrated personal and professional growth through changed attitudes, improved knowledge, and increased skills as a result of participating in the CTO Mentor Program. Candidates were exposed to new perspectives, not only from the direct instruction provided during classes, but also through the collaboration and group work with other members of their cohort. Each candidate shared stories about experiences from his or her own work environment that provided him or her new ways of perceiving and handling various situations.

Candidates expressed strong agreement that their skills increased as a result of the CTO Mentor Program and that the skills were directly applicable to their job. Eighty-eight percent agreed that the CTO Mentor Program helped to prepare them for other job opportunities within the organization.

Transferability. Resulting from their participation in the CTO Mentor Program, their positive attitudes, and desire for change, candidates were able to transfer what they learned in the program to the workplace. CTO Mentor candidates enter the program of their own volition, indicating a willingness to learn and thereby change. Candidates completed the program with a better understanding of their role and responsibilities in the K-12 educational environment. Many examples provided through the reflective portfolio artifacts appear to support the transfer of learning to the workplace. Candidates shared examples such as greater participation in leadership meetings, building better department budgets, more effective personnel management, and

improved time management strategies. Candidates appear to have gained the ability to make more informed decisions, solve problems, and function as district level administrators as a result of their participation in the CTO Mentor Program.

Productivity. Through their reflective portfolio artifacts, candidates indicated that the new knowledge and skills acquired during the CTO Mentor Program brought about change in their organizations. Examples of these changes include board policy updates, improved network security, increased communication with executive leadership (Superintendent and Assistant Superintendent), improved help desk operations and school site support, and improved project management, all of which resulted in successful technology implementations.

Significance of Findings

From the researcher's perspective, the most significant contribution of this case study demonstrates that the CTO Mentor Program provides a quality ROI for technology leaders in California K-12 educational agencies, as well as the sponsoring organization, CETPA. This research encompassed the reflections and experiences of CTO Mentor candidates spanning 7 cohort years, along with observations provided by the researcher. These finding are related to the literature surrounding effective technology leadership, adult learning, and program evaluation and will provide a foundation for future research related to creating and implementing effective leadership training programs. The following sections briefly restate the findings for the research questions that guided the study.

Research question 1. Research question 1 asked, To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations? Responses from candidates included the distinction between leadership and management, the

awareness of essential skills required for effective technology leadership, as well as a connection to adult learning theory and Kirkpatrick's level one of program evaluation.

Leadership and management. Candidates entered the CTO Mentor Program at various stages of leadership development; some were technicians, former site level administrators, technology teachers, directors of technology, and CTOs. Candidate comments and survey responses indicate that the program improved their leadership skills and clarified the difference between leadership and management. The role of technology leadership is a complex mix of leadership and management and requires skill to attain a balance between innovation and stability (McLean & Smits, 2012). Exposure to the many facets of educational technology leadership and management is supported by Northouse (2010), who stated that leadership is a process that involves influence, occur in groups, and involves common goals. Effective technology leadership requires that the leader possess and exhibit effective communication skills, courage, flexibility and adaptability, and a results-oriented and innovation approach (Brown, 2006; CoSN CTO Council, 2009). Candidates shared many examples demonstrating their growth in becoming effective technology leaders.

Essential skills. Throughout the course of study, candidates commented on what they perceived to be essential skills for a CTO. Candidates stated that effective communication skills, along with the ability to learn quickly in order to manage change effectively, were essential to their success. Awareness and knowledge of educational financial practices, including budgeting and E-Rate, were also identified as essential skills. Additionally, candidates asserted that a CTO must be able to build and manage effective teams while possessing a general knowledge of all areas of technology (routers, switches, servers, computing devices, and software). The CTO Mentor Program is based loosely on the nine essential skills as identified by the CoSN CTO

Council (2005). Maas (2010) reported that the CTO must: have the necessary skills to create, support, and monitor teams with diverse expertise; have a solid understanding of instruction and also provide meaningful professional development; and possess skills such as leadership, vision, goal setting, planning, and financial management.

Adult learning (andragogy). Candidates indicated through survey responses that they possessed the necessary prerequisite knowledge and skills for the course. Their responses indicated that they were able to take the course when they needed it, that their knowledge and/or skills increased, and that those skills were directly applicable to their job. This evidence aligns with the assumptions presented by Knowles et al. (2005) regarding adult learners, which stated that adults need to be responsible for their learning, that they come with prior knowledge, and that they come ready to learn what is relevant to their real life situations. When asked if they had an opportunity to provide input into the design of the course, 58% of the survey respondents felt like they had an opportunity to provide input. Knowles (1995) indicated in his *Designs for Adult Learning* that it is important to involve learners in the mutual planning of the course design or learning activities.

Kirkpatrick's levels of program evaluation: Level one (reaction) and level two (learning). Candidates indicated through survey responses and anecdotal evidence via artifact reflections that the facilities and equipment were favorable to learning and that they were satisfied with the instructors (95%) and the course of study (97%). These findings align with Kirkpatrick's (1996) level one (reaction), which asserts that the training program must be enjoyable, interesting, and motivating to those in attendance in order for them to achieve the most benefit.

Candidates expressed through survey responses and comments in their artifact reflections that they experienced an increase in their knowledge, an improvement in their skills, and a new

attitude toward many areas of educational technology leadership. Examples include a better understanding of the entire organization and their role in facilitating change. Candidates asserted that the information presented was highly applicable to their jobs. Kirkpatrick (1979) defined learning as participants' absorption of principles, facts, and techniques. Although the CTO Mentor Program does not employ pre and posttests to evaluate what learning is taking place (Endres & Kleiner, 1977), it appears as though learning has occurred, as evidenced by the pictures painted through the candidates' reflective writings.

Research question 2. Research question 2 asked, To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives? Candidates indicated through survey responses that they found interactive activities such as class discussions and skill exercises to be the most relevant and effective means to master the program objectives. This finding aligns with the Active Learning Credo that Silberman and Auerbach (2006) modified and expanded from Confucius:

- When I only hear, I forget.
- When I only hear and see, I remember a little.
- When I hear and see, and ask questions and discuss with someone else, I begin to understand.
- When I hear, see question, discuss, and do, I acquire knowledge and skill.
- When I teach someone, I master what I have learned. (p. 2)

The CTO Mentor curriculum appears to provide a variety of activities that align with the aforementioned credo; however, it is also import to give careful thought to matching the transfer techniques to the participants' learning style (Caffarella & Daffron, 2013).

According to Olsen (1998), the variables that lead to transfer are: the similarity between the training and the ultimate task, the amount of skills practice allowed, and feedback on how the skill is being performed. Ellis (1965) asserted that one of the components of the transfer of learning includes the use of a variety of examples when teaching concepts. Candidates shared that the artifacts created for the portfolio helped to facilitate change in their organization. Examples of relevant activities include: writing an RFP, updating the district technology plan, network diagramming, and updating school board policies.

Perceived relevance appeared to drop significantly as the candidates measured tasks such as their final presentation, the program executive summary, and the final portfolio. This finding suggests to the researcher that some of the candidates did not make the intended connection between these activities and potential tasks performed in their performance of duties. Therefore, it is important to ensure that the principles being taught are understood before expecting transfer (Ellis, 1965).

It is also important to note the nature of the relationship between the candidate and the assigned mentor. Fifty percent of the survey respondents asserted that the relationship was very relevant, and 34% found the relationship to be somewhat relevant. However, the mentor/mentee relationship was mentioned by only one candidate throughout the reflective portfolio artifacts. It appears to the researcher that the mentor/mentee relationship may not be progressing past the consulting posture, where the mentor produces or supplies the mentee with information and extends expert analysis of gaps (Lipton & Wellman, 2003).

Research question 3. Research question 3 asked, To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance? To answer this question, survey items were used to determine the extent to which

candidates used the information learned after completing the course. Prior to attending this course, 34% indicated that they used the knowledge and skills presented; however, after completing the course, 68% indicated that they use the knowledge and skills presented. Although self-reports are frequently used to determine the efficacy of a training program, it is often erroneous due to the student employing response shift bias (Mezoff, 1981), which is the propensity to inflate one's sense of learning after participating in training. Better practice for assessing the transfer of knowledge would be to have an objective observation of the candidate at his or her workplace (Guskey, 2002) or to have the candidate conduct a multi-dimensional on the job evaluation, commonly referred to as a 360-degree survey (Endres & Kleiner, 1977). Eighty percent of the respondents also indicated that their confidence increased to a great extent as a result of participating in the CTO Mentor Program. Jarvis (2006) explained that adults are affected in some way by the learning; "the person's self is changed both by the acquisition of knowledge…but also in terms of identity, self-confidence, esteem, and so on (p. 17). Forty-eight percent of the candidates felt they received the necessary assistance in preparing for this course. This finding is likely correlated to the relevancy of the mentor/mentee relationship, which is supported by Zachary's (2012) theory of learning focused relationships. Learning focused relationships provide a powerful growth experience, a process of engagement and reflective practice.

Candidates were asked specifically if they thought the CTO Mentor Program represented a good investment for their organization. Eighty percent of the respondents said yes, that they thought it was a good investment. Two candidates gave qualified responses to the question; one stated that his subordinate role in the district did not allow him or her to use utilize the skills learned; the second stated that his or her organization did not pay the tuition, but did allow

candidates to claim the days off as work time. However, it is very difficult to quantify the ROI for a training program. Based on the reflective portfolio artifact data provided by the candidates, it appears that change has occurred in the educational agencies for which the candidates work. CETPA, the sponsoring organization, has also likely received a return on their investment in terms of a growing number of interested applicants for the program. Twenty spots are available each cohort year and typically there are more than 40 applicants for consideration. The researcher believes that an additional indicator of the ROI for CETPA is evidenced in the growing attendance at CETPA's annual conference. Over the course of the past 4 years (2010-20140 attendance at the annual CETPA conference has grown from 700 to over 1,000. As the CTO Mentor final presentation, graduation, and special events occur at the annual conference, it seems as though the CTO Mentor Program has increased the annual attendance as well as the level of professional development available to K-12 technologists.

Unanticipated Outcomes and Surprises

The unanticipated outcomes and surprises of this study were few in number. Based solely on the title of the program, CTO Mentor, the researcher anticipated that the mentor would play a larger role in the development of the candidate as well as the learning process. A second surprise was that there appears to be a true ROI for both the candidates' local educational agency as well as the sponsoring organization, CETPA. This was surprising as the ROI is difficult to measure due to many complicating factors (Kirkpatrick, 1979).

The mentor relationship is at the center of the CTO Mentor Program. Quantitative survey data indicated that the majority of candidates (63%) perceived, to a great extent, that the feedback and help provided by the mentor was relevant to applying the knowledge and skills learned back at the job. However, only one citation in the reflective artifacts mentioned the

mentor relationship. Candidates did, however, speak frequently of the support received from the PLC created through the cohort activities. This finding resonates with the mentoring paradigm presented by Zachary (2012), who stated that the traditional model based on an authoritarian teacher and dependent student is being replaced by a collaborative, learning centered paradigm. The learning centered paradigm has seven critical elements: reciprocity, learning, relationships, partnerships, collaboration, mutually defined goals, and development. These elements are clearly found throughout the CTO Mentor Program, suggesting that while the formal mentor/mentee relationship has merit, the collective mentoring provided by instructors, cohort colleagues, and the entire CETPA membership creates a true community of support.

The second surprise was that there appears to be a clear ROI to the candidate and his or her local educational agency, as well as the sponsoring organization, CETPA. Kirkpatrick's four levels of program evaluation—reaction, behavior, learning (transfer), and results—provide a practical way to evaluate a learning program for adults. Level one, reaction, is clearly the easiest to measure of the four levels and is typically a part of professional development evaluations. Level two measures the knowledge learned by the student and is also a subjective measure. It is possible to quantify this measurement by having a pre/posttest for candidates, designed to measure the change in attitude, skills, and knowledge attributed to the training received. The third level, learning or transfer, is more difficult to measure as it requires evidence of on the job behavioral changes due to the training. However, the anecdotal evidence provided by the candidates' reflective writings suggests that participants did in fact exhibit a change in behavior.

The most difficult area to measure is the impact of the training on the organization. Organizations often look to garner a return on their investment to rationalize the existence of the program itself (CETPA) or to rationalize the time and money needed when sending an employee

to a training. Candidates are responsible for their tuition ($1,600), travel, and hotel costs while participating in the CTO Mentor Program. This can add up to a potential cost of $5,000 over the course of 8 months. While candidates are often sponsored by their local educational agencies, many candidates pay for the program themselves. CETPA, the sponsoring organization, contributes the additional operational funding required to successfully implement the CTO Mentor Program. On average CETPA contributes $60,000 annually to ensure the continued success of the program. CCTOs shared that their increased awareness regarding the many facets of technology leadership have produced changes in the operational processes, project managing processes, time management, communication, and opportunities for leadership.

Measuring the ROI is difficult especially when the return is not quantifiable. Although the ROI for local educational agencies may not be completely quantifiable, there are several areas where the learning acquired by the CCTO would naturally result in an organizational ROI: more effective project management resulting in lower project costs, improved purchasing practices based on improved awareness and negotiation skills acquired, and more effective customer service, to name a few. CETPA, the sponsoring organization, has seen an increase in membership and attendance at the annual conference, as well as an increase in general interest in participating in the CTO Mentor Program. The increase in participation results in an increase in revenue, which results in more program opportunities for CETPA's membership.

The researcher found the demographic make-up of the survey respondents to be particularly interesting, especially their race and job titles. These data state that the majority (78%) of the participants are Caucasian which is significantly higher than the state average of adults in K-12 education. This finding does not reflect the demographics from the state of

California's Dataquest, which suggests that for the 2013-2014 the average percentage of White (not Hispanic) adults in K-12 education is 62% (California Department of Education, n.d.).

The job titles reported by the candidates indicate that 22% of the candidates are in the position of Director of Technology or CTO when they enter the program. Several positions reported are subordinate positions (as reported through the artifact data), which may not provide the necessary access to implement the desired program outcomes.

Summary of Findings

Table 8 presents a summary of the study's findings as related to each of the three research questions.

Table 8

Summary of the Findings by Research Question

Research Question	Findings
RQ1: To what extent are there differences before and after a candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-12 educational organizations?	• Growth as an effective technology leader • Growth is the development of essential skills required for effective technology leadership • Effective program design to facilitate adult learning best practices • Program evaluation level one (reaction) and level two (learning) indicating the program design is results in an enjoyable experience for candidates and facilitates change
RQ2: To what extent do CETPA CTO candidates perceive the program's learning activities to be a relevant and effective means of mastering the program's learning objectives?	• Activities which were interactive in nature were considered the most relevant to the learner • PLCs contributed to the transfer of knowledge • The formal mentor relationship is perceived as relevant, but not as relevant as the PLC support • The culminating activities (Program executive summary, final presentation and portfolio) were not as relevant to the candidates as was the participation in class and the creation of the artifacts.
RQ3: To what extent do CETPA CTO graduates perceive the program's learning objectives to be relevant to their on the job performance?	• Learning outcomes are relevant to the job • Candidates expressed a measureable growth in their knowledge before and after the course • Increased confidence as a result of participation • ROI for CETPA, sponsoring organization as well as the local educational agency for which the candidate works

Final Thoughts about the Literature

Program design and evaluation, adult learning, leadership, and mentoring have been researched exhaustively over the years. However, the CTO Mentor Program is more than just a training program, but less than a Corporate University. The CTO Mentor Program aligns with Chenault's (1987) description of the missing option in executive training programs, which he defined as "a thoughtfully designed, long-term, integrated, continuing learning progress" (p. 50). The characteristics of the missing option include:

- A program developed collaboratively by participants, trainers, and organization;
- With individualized learning goals;
- In adult, learner-centered, self-directed study;
- Assisted by mentors;
- Who deal with connected, integrated content over a long period of time (1-2 years).

This model most closely aligns to the researcher's understanding of the CTO Mentor Program design.

There appears to be limited research surrounding professional development provided to educational employees who work in non-teacher roles, namely support positions (i.e., secretary, custodial, facilities, technology, etc.). This suggests to the researcher that there is a decided lack of training provided to support personnel; alternatively, perhaps there is a need for more evaluation of trainings provided in educational organizations. Along those lines, there is an apparent deficit in research surrounding educational leadership program evaluation.

Conclusions

The findings from this study suggest that the CTO Mentor Program provides a course of study that is relevant to the technology leader in K-12 educational agencies, meets the needs of

the adult learner, and provides a ROI for the learner, his or her educational agency, and the sponsoring organization, CETPA.

- The course content, program learning objectives, program activities, and community of support work in concert to provide a relevant learning opportunity for those technologists in the K-12 educational community who are striving for professional growth and promotion to higher levels of leadership.
- The elements of the CTO Mentor Program align with the factors known to be relevant to the learning needs of the adult learner, incorporates a mentoring model that supports the adult learner, and supports the essential skills necessary for effective technology leadership.
- The CTO Mentor Program appears to provide a ROI for the individual, the educational agency for which he or she works, and for the sponsoring organization, CETPA. The ROI is a difficult, but very important, aspect of program evaluation to capture.
    a. The demonstration of an ROI indicates to future candidates that the program is worthy of his or her time; demonstrates to the local educational agency that the time spent in class and on homework, as well as the money spent on tuition appears to result in necessary and beneficial change.
    b. The ROI justifies the budget line item for the sponsoring organization CETPA, as the return appears to manifest itself in the form of greater membership numbers and a larger attendance at the annual CETPA conference.

Implications

Implications for practice. The literature to support best practices in program design, adult learning models, the mentoring process and program evaluation has been combined with the findings and results of the research in Table 9 to illustrate considerations for improving the CTO Mentor Program.

Table 9

Program Considerations Aligned with Research

Best Practices in Program Design for Adult Learners	Citations
Professional development opportunities that meets the need of the adult learner and supports the development of necessary workplace knowledge and skills. • Essential skills • Leadership traits • Effective technology leadership • Adult learning theory	Andriole (2007); Brown (2006); Bucher et al., (2001); Caffarella & Daffron (2013); Chenault (1987); CoSN CTO Council (2005, 2009); Kearsley & Lynch (1992); Knowles (1995); Knowles et al., (2005); Maas (2010); Merriam (2001); Merriam et al. (2007); Moore (2010); Nicou (2006); Northouse (2010); Rachal (2002)
Mentoring as a means of participant development • Organizational learning process • Predictable phases of mentoring • Qualities of a successful mentor and mentee	Alexander (2002); Bicego (2006); Buck (2004); Chinnasamy (2013); Collins (2001); Daloz (1999); Davis (2005); Kotter (1996); Lipton & Wellman (2003); Maxwell (2008); Miloff & Zachary (2012); Senge (1990); Zachary (2012)

Effective program evaluation
• Assessing change in behavior
• Multiple measurements to determine learning
  ○ Pre-test/Post-test
  ○ 360-degree survey
• Measuring reaction, behavior, learning and results
	Cantor (1990); Endres & Kleiner (1977); Fast (1974); Guskey (2002); Joyce (1993); Kelley et al., (1984); Kirkpatrick (1979, 1996, 2006); McEvoy & Buller (1990); Mezoff (1981); Olsen (1998); Tyler (1971)

Based on this research, the researcher has some specific suggestions for the design and implementation of the CTO Mentor Program on an ongoing basis. The first suggestion is to review the program learning outcomes and course design annually to determine its continued relevance to K-12 education in California. If changes need to be made, they should be made

with adult learning in mind, as well as the participation and collaboration between the CTO Mentor steering committee, instructors, mentors, and recent cohort graduates. The second suggestion concerns the role of the mentor in the learning process. Mentors should be trained specifically to understand the mentoring role, the mentoring process, and best practices to help facilitate a healthy relationship between the mentor and mentee. The mentee (candidate) would also benefit from training regarding how his or her role and responsibility is related to a healthy mentor/mentee relationship. Another consideration would be for the sponsoring organization, CETPA, to increase its contribution to the overarching program effectiveness by hiring a full-time program coordinator. Currently, the ED of CETPA facilitates the CTO Mentor Program. This is not meant as an indictment of the current administration, only a suggestion that with dedicated program coordination these suggestions could be implemented and collaboration between stakeholders could be more intentional.

Program evaluation must happen continuously to determine and guarantee the effectiveness of the CTO Mentor Program. To the researcher's knowledge, candidates are provided the opportunity to give a level one evaluation after each class session. The researcher recommends that these evaluations be reviewed and revised based on the best practices provided in the research. Consideration should be given to administering a pretest/posttest to candidates to determine their growth. Consideration should be given to partnering with CoSN in providing the CETL exam to CCTOs. This could strengthen the partnership between CoSN and CETPA, lending a level of validation to both programs.

Implications for policy. Leadership training programs are provided to aspiring educational leaders in California through professional associations such as ACSA, CASBO (California Association of School Business Officials), and CETPA. Although these programs

clearly help the aspiring leader develop the necessary knowledge and skills needed to perform the job, no official certification is provided by the state credentialing office. Successful completion of these programs is recognized around the state as an indicator that the aspiring leader possesses a greater understanding of the job requirements to which they aspire, however, it is contingent on the district or county recognizing the participation as a requirement for the position. The researcher suggests that a formalized state certification would lend greater credence to the learning that is obtained through the CTO Mentor program.

Recommendations for Future Research

Methodological enhancements. This study was designed based on the goals of this research using recent literature to support the methodology. This study was limited to the program candidates who participated in the CTO Mentor Program with a focus on the candidates' perspective. If this study were to be repeated, it would be interesting to include the perspectives of instructors, mentors, and the local educational agency leadership. Each of these groups would provide another layer of understanding of the impact of the learning as a result of CTO Mentor Program participation. It would also be interesting to study the effect of the acquisition of the CCTO Certification on the career advancement opportunities of those who participated; did CCTOs receive promotions or career opportunities based on their new knowledge?

Proposed future research. This case study research provides a detailed analysis of the relevance of the CTO Mentor Program to the career of the aspiring technology leader in California K-12 educational organizations. Proposed future research projects are presented subsequently:

1. A study to examine the differences between the CCTO who participate in the CETPA CTO Mentor Program and those who pass the CETL exam. In other words, is there a difference in the transfer of knowledge and skills, as well as the ROI, when participating in sustained professional development with built-in supports versus passing a certification exam?
2. A study to examine the efficacy, transferability and ROI in other California educational leadership training programs, such as the ACSA Academies and CASBO CBO programs.

Final Summary

This case study was designed to evaluate the efficacy, transferability of skills, and ROI of the CETPA CTO Mentor Program. The success of the CTO Mentor Program was based on the effective program design, meeting the needs of technology leaders in California K12 education, and supporting the goals of the sponsoring organization, CETPA. The CETPA steering committee, instructors, mentors, board of directors, and CCTOs create a community of practice whose goal is to advance the efficacy of educational technology and the careers of educational technologists in California K-12 organizations.

In order to support the 21st century learning initiatives including mobile devices, common core standards, online high stakes testing, and student privacy, among others, an educational organization must employ a well-trained, knowledgeable, and effective technology leader. The CETPA CTO Mentor certification provides assurance that the chosen technology leader has been exposed to, is familiar with, has a working knowledge of, and can apply the leadership, educational, and technology skills necessary to be a successful technology leader. Superintendents who are looking to hire effective educational technology leadership for their

organizations should consider looking to CETPA as the recognized authority for effective technology leadership training and development.

This research provides insight into the necessary skills and leadership qualities of effective technology leadership. Effective technology leadership in California K-12 educational agencies requires an understanding of all aspects of the educational organization as well as the ability to navigate the rapidly changing landscape that surrounds technology and education today. Continued research on the effectiveness of leadership programs, not limited to technology, will provide organizations necessary information on the appropriate skills needed and will further ensure that candidates who avail themselves of further education and training will be the successful leaders of the future.

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APPENDIX A

Request to Use Impact Questionnaire for Leadership Development Program

Email request sent February 22, 2014 via form tool located on the following websites:
http://www.roiinstitute.net/contact/jack-phillips-phd/ and
http://www.usm.edu/gulfcoast/email/16600/field_contact_email

Dear Dr. Phillips,

My name is Julie Judd and I am currently an Organizational Leadership Doctoral student at Pepperdine University in Southern California. My dissertation study is an evaluation of a technology leadership training program (CTO Mentor) sponsored by our state technology organization CETPA (California Educational Technology Professionals Association).

I'm writing you today to request permission to utilize questions from your book "How to Measure Training Results," specifically questions from the Impact Questionnaire for Leadership Development Program located on page 125. The template was downloaded from the McGraw-Hill website provided through the purchase of your book,

It is my goal to evaluate the CTO Mentor through the lens of the Kirkpatrick Level 1-4 through a concurrent mixed methods case study. The ability to utilize the resources in your book will be invaluable to the success of my study.

Thank you for your consideration. I look forward to hearing from you.

Kind regards,

Julie Judd

Julie D. Judd
Doctoral Student
Organizational Leadership
Graduate School of Education and Psychology
Pepperdine University
[redacted]

APPENDIX B

Permission to Use Impact Questionnaire for Leadership Development Program

Re: ROI Web Submission

Jack Phillips [jack@roiinstitute.net]

Follow Up. Start by Monday, February 24, 2014. Due by Monday, February 24, 2014.
You replied on 2/24/2014 6:33 PM.

Sent: Monday, February 24, 2014 8:07 AM

To: Judd, Julie (student)

Dear Julie,

Yes, you have permission to utilize elements from the Impact Questionnaire for Leadership Development Program in your study. All we ask is that you give ROI Institute proper credit for this information.

Best of luck!

If you have any questions, please let me know.

Best,

Jack Phillips

APPENDIX C

Request to Use Kirkpatrick Methodology

Email request sent on February 22, 2014 to the following email addresses:
[redacted] and [redacted]

Dear Kirkpatrick Partners,

My name is Julie Judd and I am currently an Organizational Leadership Doctoral student at Pepperdine University in Southern California. My dissertation study is an evaluation of a technology leadership training program (CTO Mentor) sponsored by our state technology organization CETPA (California Educational Technology Professionals Association).

I'm writing you today to request permission to utilize questions from your book "Evaluating Training Programs: The Four Levels" , specifically questions from Chapter 17 "Evaluating a Leadership Development Program," and chapter 23 "Evaluating an Information Technology Skills Training Program."

It is my goal to evaluate the CTO Mentor through the lens of the Kirkpatrick Level 1-4 through a concurrent mixed methods case study. The ability to utilize the resources in your book will be invaluable to the success of my study.

Thank you for your consideration. I look forward to hearing from you.

Kind regards,

Julie Judd

Julie D. Judd
Doctoral Student
Organizational Leadership
Graduate School of Education and Psychology
Pepperdine University
[redacted]

APPENDIX D

Permission to Use Kirkpatrick Methodology

FW: Request for permission
Linda.hawk [linda.hawk@kirkpatrickpartners.com]

To help protect your privacy, some content in this message has been blocked. If you are sure that this message is from a trusted sender and you want to re-enable the blocked features, click here.
You replied on 2/25/2014 8:42 PM.

Sent: Tuesday, February 25, 2014 5:43 AM
To: Judd, Julie (student)
Cc: inquiries@kirkpatrickpartners.com

Dear Julie,

Thank you for your interest in our methodology. We are happy to grant permission to use our questions as you describe.

If possible, we would like to receive a copy of your dissertation when you have finished writing it. It sounds like a very interesting study and we like to see how others are using our model.

Please let me know if you have any other questions.

Regards,
Linda

Linda Hawk
Kirkpatrick Partners
Customer Service: 443-856-4500

Thank you for supporting the One and Only Kirkpatrick® company

APPENDIX E

Request for CTO Mentor Program Information

Andrea Bennett
Executive Director
CETPA
[redacted]

Dear Ms. Bennett,

My name is Julie Judd and I am a doctoral student in the Graduate School of Education and Psychology at Pepperdine University. The research I wish to conduct for my doctoral study involves the evaluation of the CTO Mentor Program. This study will conducted under the supervision of Dr. Jack McManus of Pepperdine University.

I am hereby seeking your consent to access contact information and portfolio artifacts for the participants in the CTO Mentor Program including the candidates, mentors and instructors since the inception of the CTO Mentor Program.

I have provided you with a copy of my project study proposal which includes copies of the online survey questionnaire, consent forms to be used in the research process, as well as a copy of the approval letter which I received from the Pepperdine IRB committee.

Upon completion of the study, I will submit a program evaluation white paper and prepare a presentation for CETPA stakeholders. It is my hope that this study will provide program evaluation data to hone the curriculum, affirm successes, and make suggestions for continuous improvement.

If you require further information, please do not hesitate to contact me at [redacted] or at [redacted]. Thank you for your time and consideration.

Sincerely,
Julie D. Judd
Pepperdine University

APPENDIX F

Impact Questionnaire for CTO Mentor Program

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

Instructions for Research Participation

Thank you for agreeing to participate in this Doctoral research project.

CTO MENTOR PROGRAM CASE STUDY:

Examining the Effectiveness of the CTO Mentor Program and its impact on the K-20 Technology Leaders' Career.

This study seeks to identify the extent to which differences exist before and after candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-20 educational organizations.

Instructions

* Please complete this questionnaire as promptly as possible. To provide responses, you will need to reflect on the CTO Mentor Program and think about specific ways in which you have applied what you learned from each session. It may be helpful to review the materials from each session.

* Please take your time as you provide responses. Accurate and complete responses are very important. You should be able to provide thorough responses in approximately 30-45 minutes.

* Please be objective in providing responses. In no way will your name be linked to your input.

* Your responses will help to determine the impact of the CTO Mentor Program.

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

Informed Consent

The possible benefits to me or society from this research are: This study is important as its results could provide rationale for further development or enhancement of the curriculum as well as support the importance of executive training programs focused on K-12 technology leadership in other states.

If you have questions concerning the research, please direct inquiries to Dr. Jack McManus at jack.mcmanus@pepperdine.edu. If you have questions about your rights as a research participant, please contact Dr. Thema Bryant-Davis, IRB Chairperson at Pepperdine University's Graduate School of Education and Psychology at 310.568.5600 or by email at thema.bryant@pepperdine.edu.

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

Section I: Demographic Information

Check the appropriate answer to each question:

***1. Please indicate your gender below:**

- M
- F

***2. Please check the appropriate box below indicating your age group:**

- 25-35 years
- 36-45
- 46-55
- 55+

***3. Please indicate your ethnicity below:**

- African American
- American Indian/Alaskan Native
- Asian
- Caucasian
- Hawaiian
- Hispanic/Latino
- Pacific Islander
- Two or More
- Decline to State

***4. How long have you worked for your current organization?**

- 2 years or less
- 3-5 years
- 6-10 years
- 11-20 years
- 20+ years

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

***5. Are you currently working in a supervisory or management role/capacity?**

- Yes
- No

***6. What title do you currently hold?**

- CTO
- Director of Technology
- Technology Coordinator
- Other (please specify)

***7. I currently work in a:**

- K-12 School District
- County Office of Education
- Private School
- Charter School
- Other (please specify)

***8. Have you participated in the CTO Mentor Program?**

- Yes
- No

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

***9. If yes, in what role did you participate? (Check all that apply)**

- ☐ Candidate
- ☐ Mentor
- ☐ Instructor
- ☐ Steering Committee
- ☐ I have not participated

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

***10. If CTO Candidate, in which cohort were you in?**

- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- Not Applicable

***11. If CTO Mentor, in which cohort did you serve as mentor? (Check all that apply)**

- 2007
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- Not Applicable

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

***12. If CTO Instructor, in which cohort did you serve as instructor? (Check all that apply):**

- ☐ 2007
- ☐ 2008
- ☐ 2009
- ☐ 2010
- ☐ 2011
- ☐ 2012
- ☐ 2013
- ☐ 2014
- ☐ Not Applicable

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

Section II: Reaction-Learning-Behavior

Indicate the extent to which you think your application of knowledge, skills, and behavior learned from the CTO Mentor Program had a positive influence on the following business measures in your own work or your work unit.

13. PART A: Please check the appropriate response beside each measure.

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
I had the knowledge and/or skills required to start this course	○	○	○	○	○
The facilities and equipment were favorable to learning	○	○	○	○	○
I was able to take this course when I needed it	○	○	○	○	○
I clearly understood the course objectives	○	○	○	○	○
The course met all of its stated objectives	○	○	○	○	○
The way the course was delivered (such as classroom, computer, and video) was an effective way for me to learn this subject matter.	○	○	○	○	○
Participant materials (handouts, workbooks, etc.) were useful during the course.	○	○	○	○	○
I had enough time to learn the subject matter covered in the course	○	○	○	○	○
The course content was logically organized	○	○	○	○	○
I had an opportunity to give input to the course design or content	○	○	○	○	○
Overall I was satisfied with the instructors	○	○	○	○	○
My knowledge and/or skills increased as a result of this course	○	○	○	○	○
The knowledge and/or skills are directly applicable to my job	○	○	○	○	○
The course has helped prepare me for other job	○	○	○	○	○

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

opportunities within the company or industry					
Overall, I was satisfied with this course					

Please cite specific examples or provide more details:

14. PART B: Indicate the extent to which you think your application of knowledge, skills, and behavior learned from the CTO Mentor Program had a positive influence on the following business measures in your own work or your work unit.

	To a very great extent	To a great extent	To a moderate extent	To a small extent	Not at all
To what extent did you use the knowledge and/or skills prior to attending this course?					
To what extent have you had the opportunity to use the knowledge and/or skills presented in this course?					
To what extent have you actually used the knowledge and/or skills presented in this course, after completing the course?					
To what extent has your confidence in using the knowledge and/or skills increased as a result of this course?					
To what extent did you receive the assistance necessary in preparing you for this course?					
To what extent has the content of this course accurately reflected what happens on the job?					
To what extent have you had access to the necessary resources (e.g., equipment and information) to apply the knowledge and/or skills on your job?					
To what extent have you received help, through mentoring and/or feedback,					

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

with applying the
knowledge and/or skills on
the job?

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

Section III – Relevance and Transfer

Section three will ask questions on the relevance of this course to your job and the transferability of learning to the job. Several of the questions will be open ended.

15. Please rate answers on a scale of 1-3. The relevance of each of the program elements to mastering the programs learning objectives in the CTO Mentor program, with (1) indicating no relevance, (2) some relevance and (3) indicating very relevant.

	Very Relevant	Some Relevance	No Relevance
Group (Class Discussions)	○	○	○
Small Team Discussions	○	○	○
Skill Exercises (Scenarios, Role Plays, etc.)	○	○	○
Program Content	○	○	○
Mentor Relationship	○	○	○
Portfolio/Final Project	○	○	○
Program Executive Summary	○	○	○
Final Presentation	○	○	○
CCTO PLC	○	○	○

16. Have you used the written materials/class materials since you participated in the CTO Mentor Program?

- ○ Yes
- ○ No
- ○ N/A
- ○ Please explain:

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

17. What has changed about you or your work as a result of your participation in this program? (Consider specific behavior change such as; increased delegation to employees, improved communication with employees, employee participation in decision making, improved problem solving, etc.).

18. How has your organization benefited from your participation in the program? Please identify specific business accomplishments or improvements that you believe are linked to participation in this program. (Think about how the improvements actually resulted in influencing business measures such as; improved processes, improved customer satisfaction, improved employee satisfaction, decreased costs, saved time, etc.)

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

19. Do you think the CTO Mentor Program represented a good investment for your organization?

- ○ Yes
- ○ No
- ○ Please explain.

20. What additional benefits has your organization derived from this program?

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

21. What barriers, if any, have you encountered that have prevented you from using skills/behaviors gained in the CTO Mentor Program?

- ☐ I have had no opportunity to use the skills
- ☐ I have not had enough time to apply the skills
- ☐ My work environment does not support this type of program
- ☐ This material does not apply to my job situation

Other (please specify)

22. What enablers, if any, are present to help you use the skills or knowledge gained from this program? Please explain.

- ☐ Administrative Support
- ☐ Team Support/Buy In
- ☐ Other (please specify)

23. What additional support could be provided by management that would influence your ability to apply the skills and knowledge learned from the program?

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

24. Would you recommend the CTO Mentor Program to others?

- Yes
- No
- Please explain why you would or wouldn't recommend the CTO Mentor Program.

25. What specific suggestions do you have for improving this program?

Impact Questionnaire for CETPA CTO MENTOR PROGRAM

Thank you for your participation

Thank you for participating in this research study.

Significant findings will be shared to all participants at the conclusion of the research study.

For participating in this research project, you will be entered into a random drawing to receive a $50.00 Amazon Gift card or a $50.00 Starbucks gift card.

APPENDIX G

Informed Consent Form

Participant: _____

Principal Investigator: Julie D. Judd, under the direction of

Dr. Jack McManus, GSEP, Pepperdine University

Title of Research Project:

AN EVALUATION OF THE CTO MENTOR PROGRAM:

Examining the Effectiveness of the CTO Mentor Program and its impact on the K-20 Technology Leaders Perception of Effective Technology Leadership

1. I, [Enter full name], agree to participate in the research study being conducted by Julie D. Judd under the direction of Dr. Jack McManus, Graduate School of Education and Psychology, Pepperdine University.

2. The overall purpose of this research: This study seeks to identify the extent to which, if at all, differences exist before and after candidates' completion of the CETPA CTO Mentor Program with regard to their perception of effective technology leadership in California K-20 educational organizations.

3. My participation will involve the following: I will be asked to participate in an online self-reporting questionnaire involving my perceptions of the CTO Mentor program during my participation in the program and from the time since the program. I will be asked to allow access to archival evidence of learning from the cohort year in which I participated. I am voluntarily participating in this research and can answer (or not answer) any question that I so choose. I understand that my answers will be recorded but that my information will be kept confidential. I will not be identified in the research or in any publications that results from this research. My participation in the study will take between 30 and 60 minutes and will be conducted online.

4. I understand that the possible benefits to me or society from this research are: This study is important as its results could provide rationale for further development or enhancement of the curriculum as well as support the importance of executive training programs focused on K-12 technology leadership in other states.

5. I understand that there are certain minimal risks that might by associated with research. These risks include: being asked questions which are uncomfortable to answer, being asked questions that would reveal personal information, and being asked questions which may bring back painful memories regarding my experience or job situation. I understand that I am free to answer (or not answer) any question asked as a part of the survey or potential follow-up interview and that I can stop my participation at any time without any negative consequences.

6. I understand that I may choose to not participate in this research.

7. I understand that my participation in voluntary and that I may refuse to participate and/or withdraw my consent and discontinue participation in the project or activity at any time without penalty or loss of benefits to which I am otherwise entitled.

8. I understand that the investigator(s) will take all reasonable measures to protect the confidentiality of my records and my identity will not be revealed in any publication that may result from this project. The confidentiality of my records will be maintained in accordance with applicable state and federal laws.

9. I understand that this investigator is willing to answer any inquiries I may have concerning the research herein described. I understand that I may contact Dr. Jack McManus at [redacted] if I have other questions or concerns about this research. If I have questions about my rights as a research participant, I understand I can contact Dr. Thema Bryant-Davis, IRB Chairperson at Pepperdine University's Graduate School of Education and Psychology at [redacted] or by email at [redacted]

10. I will be informed of any significant findings developed during the course of my participation in this research which may have bearing on my willingness to continue in the study.

11. I understand to my satisfaction the information regarding participation in the research project. All my questions have been answered to my satisfaction. I have received a copy of this informed consent form which I have read and understand. I hereby consent to participate in the research described above.

12. In order to use the data from the study, please consider the following additional permissions. Please initial the appropriate line.

_____ I agree to participate in this research and would allow access to archived learning materials (feedback, reflections, artifacts, and portfolio). These individual responses would not be associated with my name or workplace, and would be referred to only by a pseudonym.

OR

_____ I agree to participate in this research but do not wish to grant access to archived learning materials.

Participant Signature _____

Data _____

APPENDIX H

IRB Approval

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

July 30, 2014

Julie Judd

Protocol #: E0614D05
Project Title: Examining the Effectiveness of the CTO Mentor Program and its impact on the K-12 Technology Leaders' Career

Dear Ms. Judd:

Thank you for submitting your application, *Examining the Effectiveness of the CTO Mentor Program and its impact on the K-12 Technology Leaders' Career,* for exempt review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The IRB appreciates the work you and your faculty advisor, Dr. McManus, have done on the proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations (45 CFR 46 - http://www.nihtraining.com/ohsrsite/guidelines/45cfr46.html) that govern the protections of human subjects. Specifically, section 45 CFR 46.101(b)(2) states:

> (b) Unless otherwise required by Department or Agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:
>
> **Category (2) of 45 CFR 46.101**, research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: a) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

In addition, your application to waive documentation of informed consent has been approved.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit a **Request for Modification Form** to the GPS IRB. Because your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the GPS IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* (see link to "policy material" at http://www.pepperdine.edu/irb/graduate/).

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval. Should you have additional questions, please contact Kevin Collins, Manager of the Institutional Review Board (IRB) at gpsirb@peppderdine.edu. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,

Thema Bryant-Davis, Ph.D.
Chair, Graduate and Professional Schools IRB

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
Mr. Brett Leach, Compliance Attorney
Dr. Jack McManus, Faculty Advisor