

2015

# Early Childhood Teacher Perspectives of Developmentally Appropriate use of Computer Applications

Heather S. White  
*Walden University*

Follow this and additional works at: <http://scholarworks.waldenu.edu/dissertations>



Part of the [Special Education Administration Commons](#), and the [Special Education and Teaching Commons](#)

---

This Dissertation is brought to you for free and open access by the Walden Dissertations and Doctoral Studies Collection at ScholarWorks. It has been accepted for inclusion in Walden Dissertations and Doctoral Studies by an authorized administrator of ScholarWorks. For more information, please contact [ScholarWorks@waldenu.edu](mailto:ScholarWorks@waldenu.edu).

# Walden University

COLLEGE OF EDUCATION

This is to certify that the doctoral study by

Heather S. White

has been found to be complete and satisfactory in all respects,  
and that any and all revisions required by  
the review committee have been made.

Review Committee

Dr. M. Lewis Putnam, Committee Chairperson, Education Faculty

Dr. Derek Schroll, Committee Member, Education Faculty

Dr. Karen Hunt, University Reviewer, Education Faculty

Chief Academic Officer

Eric Riedel, Ph.D.

Walden University  
2015

Abstract

Early Childhood Teacher Perspectives of Developmentally Appropriate use of Computer  
Applications

by

Heather S. White

MS, University of Central Missouri, 1997

BS, University of Central Missouri, 1995

Doctoral Study Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Education

Walden University

March 2015

## Abstract

There is little evidence in the literature that early childhood (EC) teachers are using developmentally appropriate practices (DAP) in implementing computer applications in their classrooms. The purpose of this study was to identify EC teachers' perspectives about the use of developmentally appropriate computer applications and to identify their perspectives on strategies for implementing change toward greater use of developmentally appropriate computer applications. The study was based upon Joseph and Reigeluth's conceptual framework of systemic change processes, which provides educators with the foundation to achieve sustainable changes. The research questions that guided this qualitative case study were designed to obtain teachers' perspectives about the use of DAP while embedding technology into EC classrooms and strategies that might be used in encouraging use of DAP computer applications. Data collection included semistructured interviews with 10 EC teachers in one school and reviews of relevant documents. Data from interviews and document reviews indicated a perceived need for more integration of developmentally appropriate computer technology in the classroom and for increasing teachers' knowledge of DAP through training and staff development. Recommendations for schools included finding more and varied technology funding sources, placing greater school emphasis on the importance of a learning organization, and increasing stakeholder involvement. For teachers, recommendations were to develop additional instructional strategies for embedding DAP technology into the classroom. This study has the potential to help stakeholders and EC teachers enhance the fidelity of instruction and students' learning in the classroom.

Early Childhood Teacher Perspectives of Developmentally Appropriate use of  
Computer Applications

by

Heather S. White

MS, University of Central Missouri, 1997

BS, University of Central Missouri, 1995

Doctoral Study Submitted in Partial Fulfillment  
of the Requirements for the Degree of  
Doctor of Education

Walden University

March 2015

## Dedication

This journey is dedicated to my son, Carter “Cdub” Michael. I want to be an example of a hard-working, dedicated, and steadfast role model for you. I want to show you procrastination is not an option and to go out and get what you want! You are the most amazing young man and I dedicate this degree to you! I love you to the moon and back.

## Acknowledgments

Dr. Putnam, thank you for your dedication and attention to detail. It has been my honor to work with you. I have appreciated your willingness to provide me with constructive feedback and support me through this process! My hope is that you have many enjoyable hours with your horses!

Dr. Hunt, Dr. Deris, and Dr. Schroll, thank you for your comments and advice. I really appreciate your forethought on looking closer at the structure and content of my research. Thank you for all of your expertise, input, and commitment to my work.

To my mother, Yvonne, there are no measurements to calculate the amount of support you have given me. Your encouragement has been unwavering. I will never forget how hilarious you looked with the spotlight on your head while you would read to me on all of those road trips. Thank you for believing in me.

To one of my mentors, Dr. Dennis Burnett, thank you for your support. One of the first things you taught me along the way was to appreciate the fact that I didn't have type this whole thing on a typewriter.... and you were RIGHT!

To my friend, Ashley, I appreciate the example you are of being a student, mother, wife, full-time employee, Christian, and friend. Thank you for standing beside me every step of the way. P.S. "Wanna get, like another degree?"

To my friends and sister, Brooke, Dawn, Elizabeth, Mickie, and Jenson, thank you for accepting, "I have to do homework" as the reason I couldn't participate in some of the fun activities you've been doing over the last few years. I am ready to catch up now.

## Table of Contents

Section 1: Introduction to the Study .....	1
Introduction .....	1
Local Problem .....	2
Problem Statement.....	4
Research Questions .....	5
Purpose of the Study.....	5
Conceptual Framework .....	6
Broad Stakeholder Ownership.....	7
Learning Organization Development .....	8
Understanding Systemic Change.....	8
Evolving Mindsets.....	9
Systems View of Education.....	9
Systems Design .....	10
Definitions .....	11
Assumptions .....	12
Limitations.....	12
Scope... ..	13
Delimitations .....	14
Significance .....	14
Summary.....	16
Section 2: Literature Review .....	18



Introduction .....	18
Background.....	19
Piaget’s Developmental Theory .....	20
Vygotsky and Social Constructivism .....	22
Integrating Technology .....	23
Developmentally Appropriate Practices.....	24
Use of Technology in the Classroom .....	26
Teacher Preparation.....	27
Professional Development.....	29
Advantages of Technology in the Classroom.....	30
Barriers of Technology and DAP .....	31
Possible Solutions and Versatility .....	33
Conceptual Framework .....	34
Summary.....	35
Section 3: Research Method.....	37
Introduction .....	37
Research Design .....	37
Research Questions .....	39
Research Review .....	39
Informed Consent and Protection of Participants’ Rights.....	40
Methods for Protection of Human Subjects .....	41
Role of the Researcher.....	42

Participants and Setting .....	43
Data Collection .....	43
Data Analysis.....	46
Validity and Trustworthiness .....	47
Summary.....	48
Section 4: Results .....	49
Introduction .....	49
Process for Generating Data.....	50
Data Collection.....	51
Participants .....	53
Systems for Tracking Data .....	53
Findings .....	55
Research Question 1 .....	55
Advantages and Disadvantages of Technology by Early Childhood	
Teachers.....	71
Research Question 2 .....	74
Document Analysis .....	83
Document Analysis Summary .....	85
Discrepant Cases .....	86
Evidence of Quality .....	88
Summary.....	89
Section 5: Interpretations, Implications, and Recommendations .....	90

Overview of the Study .....	90
Research Questions .....	91
Interpretation of Research Question 1 .....	92
Developmentally Appropriate Practices .....	93
Lack of Resources .....	94
Embedding Technology.....	95
Interpretation of Research Question 2 .....	97
Implications for Social Change .....	103
Implications for Social Change - Student Learning .....	103
Implications for Social Change – School Environment .....	104
Implications for Social Change - Teachers .....	105
Recommendations for Action.....	106
Recommended Action – Increased Resources .....	106
Recommended Action – Stakeholder Buy-In.....	107
Recommended Action – Develop Learning Organization .....	107
Recommended Action – Instructional Coaches and Guidelines .....	108
Recommendations for Further Study.....	109
Reflection .....	110
Conclusion.....	111
References .....	112
Appendix A: Request to Conduct Research .....	124
Appendix B: Letter of Cooperation.....	126

Appendix C: E-Mailed Letter / Consent Form .....	128
Appendix D: Early Childhood Teachers' Interview Questions.....	131

## Section 1: Introduction to the Study

### **Introduction**

Early childhood teachers strive to provide high quality and high fidelity instruction. Technology use is available to enhance instruction. Gray, Thomas, and Lewis (2010) reported that Internet access is available on 93% of classroom computers and 97% of the teachers reported having computers in the classroom. The challenge is how to manage developmentally appropriate computer applications, monitor student success, and demonstrate the benefit of technology as an instructional tool.

Technology is used by educators in the classroom for a variety of purposes. The majority (75%) of educators who use technology in the classroom do it because children enjoy using it (Simon, Nemeth, & McManis, 2013). In addition, 50% of educators use technology because they see it as helping them meet the goals of their program, and 21% use technology because it is a requirement by their program (Simon, Nemeth, & McManis, 2013).

Technology use can also be educational. There has been a correlation between adult guidance for computer usage and increases in students' abstract reasoning, visual-motor coordination, visual memory, and planning behavior (McManis & Gunnewig, 2012). Children who are engaged with technology in peer groups or teacher-led activities can experience a powerful type of learning (McManis & Gunnewig, 2012).

Computer applications are dynamic and multileveled in many cases. Ntuli and Kyei-Blankson (2010) concluded that in order to meet the challenges of each student, teachers must use more programs that take into consideration students varied life-

experiences and skills. Technology use in the early childhood classroom offers teachers and students additional tools to engage in learning opportunities. The use of computer applications can be highly motivating and offer many opportunities to children within the classroom, however; adult guidance and purposeful, developmentally appropriate practices facilitate high fidelity instruction (Ntuli & Kyei-Blankson, 2010).

The use of computer applications, and technology in general, in schools has been debated among researchers. Conati and Manske (2009) critiqued the use of technology in the classroom, concluding that educational games are increasingly more widespread and used as a form of entertainment for children. Educators have been trying to capitalize on the appealing nature of games in order to teach academic concepts and enhance curriculum activities. Educational games can be motivating, however; there is inconclusive evidence on their pedagogical effectiveness (Conato & Masnske, 2009). The purpose of this study is to identify early childhood teachers' perceptions about these issues.

### **Local Problem**

According to an early childhood special education principal, there are no guidelines to determine developmentally appropriate practices (DAP) computer applications within the district. An employee from the office of district instruction and technology explained, currently there is not a checklist for determining developmentally appropriate software, but the district does offer software assistance from a logistical perspective (set up and management). She went on to clarify that the district offers curriculum alignment information for K-12, but not for early childhood. Additionally, an

early childhood teacher confirmed the district had provided limited information regarding the implementation of technology into their classrooms. As a result of limited resources for implementing developmentally appropriate computer applications, there is inconsistent implementation of DAP in all early childhood classrooms.

I reviewed 3 consecutive years of early childhood special education program professional development and staff meeting agendas. I completed this review to determine if there had been any training with regard to developmentally appropriate practices for the purpose of embedding technology. In the school year of 2010-2011, the early childhood special education program conducted six staff meetings and three professional development days. The meeting agendas listed (but not limited to) the following topics: adopt-a-family information, school calendar changes, and review of crisis plan. The professional development topics were; conscious discipline, kindergarten instructional alignment guide review, and an overview of The Creative Curriculum System for Preschool were presented to the staff.

The administration conducted four staff meetings and three professional development days during the school year of 2011-2012. Additionally, the meeting agenda topics included (but were not limited to): preschool assessment instruction, transition to kindergarten process, and parents as partners' week. During the 2012-2013 school year there were four staff meetings and four professional development days. The staff meeting agenda topics were: Information about Jim Stone's Animated Literacy program, safety and intruder procedures, and (DESE visit announcements. The professional development topics included: Missouri outcomes summary sheet, phonemic acquisition

information, and rigor and relevance (a district initiative) were explained to the staff.

This further demonstrates the lack of emphasis on embedding developmentally appropriate computer applications, monitoring student success while utilizing technology, or demonstrating the benefit of technology as an instructional tool.

### **Problem Statement**

The primary focus in early childhood classrooms should be, creative play, real-life experiences, experiences out of the classroom, physical movement, and social interactions with technology and media being introduced in conjunction with the other activities (National Association of Education of Young Children [NAEYC], 2012). The problem is that many teachers rely on their basic instincts or previous experiences when implementing computer applications. The core principle of providing high fidelity instruction is the extent to which a specific program is consistent with the actual intended program's model (Century, Rudnick, & Freeman, 2010). Early childhood teachers are unable to provide children with the just-right-challenge via developmentally appropriate computer access without guidelines on which applications are best suited for what age.

Implementing high fidelity instruction is dependent on the extent to which a specific program is similar to the actual program's model (Century, Rudnick, & Freeman, 2010). Early childhood teachers are unable to provide children with developmentally appropriate computer access without guidelines on which applications are best suited for what age. However, there is a gap in the research, leaving little guidance via checklists, recommendations, guidelines, or parameters for selecting developmentally appropriate computer software.



It is imperative that teachers provide intellectually powerful, learner-centered instruction. Inactive use of technology, or other types of screen media, may be inappropriate as a supplement for active play and socialization (NAYEC, 2012). There is a need for administrators and teachers, who are invested in educational policy and practices, to gain insight on the possibilities for integrating new technology within early childhood classrooms (Burnett, 2010). Administrators and teachers should make informed decisions about children's experiences and responses to such opportunities (Burnett, 2010). The evidence on how to effectively make these decisions continues to allude local early childhood administrators and teachers.

### **Research Questions**

1. What are teacher perspectives about the use of developmentally appropriate practices while embedding technology into early childhood classrooms?
2. What strategies do early childhood teachers believe would be best to implement change toward using developmentally appropriate computer applications?

### **Purpose of the Study**

Teachers are embedding new computer applications into the early childhood classroom. However, there is no evidence that early childhood teachers are implementing developmentally appropriate practices (DAP). Therefore, this study was intended to identify early childhood teachers' perspectives about the use of developmentally appropriate computer applications within their classroom in a large urban school district. In addition, I collected data on potential strategies that teachers use, based on what early

childhood teachers believe to be the best way to implement change toward using developmentally appropriate computer applications.

Locally, early childhood teachers are not accessing developmentally appropriate technology to enhance their pedagogical interventions. According to one early childhood teacher, these teachers are not provided with strategies for determining developmentally appropriate software.

Technology should be used as a teaching tool that is essential to successful outcomes instead of as a supplemental teaching tool (Ertmer & Ottenbreity-Leftwich, 2010). The use of developmentally appropriate software in connection with curriculum offers children another medium to practice and rehearse skills. Technology, when used effectively, is an effective tool (Ertmer & Ottenbreity-Lefwich, 2010). Early childhood teachers, when embedding supplemental technology for the purpose of accentuating instruction, are using technology as an effective tool. Subsequently, when teachers use a variety of tools they are more likely to access individual students' needs.

### **Conceptual Framework**

This study's conceptual framework was based upon Joseph and Reigeluth's (2010) systemic change process. This framework will serve as a "lens through which to review important educational change efforts and school change" (Joseph & Reigeluth, 2010, p. 98). Conceptual frameworks are related to the methodology associated with qualitative research. This forms theory and occurs through an inductive process.

Joseph and Reigeluth (2010) theorized that educators must understand how educational change is achieved and that change is most effective when constructed in a

purposeful and systemic manner. Joseph and Reigeluth's (2010) outlined the major elements for systemic change as, "(a) broad stakeholder ownership, (b) development of a learning organization, (c) understanding the systemic change process, (d) evolving mindsets about education, (e) systems view of education, and (f) systems design" (p. 99). The intent for systemic change was based on the results of this study to (a) identify the stakeholders for identifying and implementing developmentally appropriate use of technology, (b) collect data on early childhood teachers' perspectives of developmentally appropriate use of computer applications, (c) analyze the data and look for understanding on how to implement developmentally appropriate use of technology, (d) disseminate findings to facilitate evolving mindsets about implementing DAP, (e) through the analysis of the data the systems view of implementing developmentally appropriate computer applications will be identified, and (f) take the stakeholders on a path from not utilizing data to make informed decisions to data based decisions yielding purposeful implementation of developmentally appropriate technology.

### **Broad Stakeholder Ownership**

It is important to bring a variety of educators together to create a wide continuum of diverse life experiences, and opinions to strengthen the process of change (Joseph & Reigeluth, 2010). The process will entail gaining insight on teachers' perspectives and their ideas on how to increase the use of DAP (Joseph & Reigeluth, 2010). Bringing together people from the community to be a part of the stakeholder group may also be important (Joseph & Reigeluth, 2010). At the completion of this this research study, the stakeholders will be given a breadth of data to facilitate further decision making to make

informed decisions on the future of implementing developmentally appropriate computer applications into the early childhood classroom to implement change.

### **Learning Organization Development**

The development of a learning organization is one of the key elements for educational change (Joseph & Reigeluth, 2010). The learning organization is the ideal version of an organization (e.g., the classroom). These authors continued that the learning organization is the facet of the framework that groups all of the elements together. The learning organization in this study, early childhood professionals, at the time of this study did not participate in professional development opportunities for the purpose of embedding developmentally appropriate technology opportunities. More and Travers (2013) suggested that early childhood teachers should follow the principles of educational technology to increase their skill-set on being critical consumers of technology. Although, some computer applications are missing these principles such as; instruction, content, accessibility, and child specific features that are characteristics of high-quality educational software (More & Travers, 2013, p. 17).

### **Understanding Systemic Change**

Educators and stakeholders should have an extensive understanding of the process of change. Joseph and Reigeluth (2010) explained, educational stakeholders included the individuals in the community that have an interest in the education of students in their community. The group of stakeholders will make decisions based on the data and learning organization outcomes. The goal of the change process is to create systems where teachers succeed at facilitating student success (Joseph & Reigeluth, 2010). After

these decisions are made about the systemic change process, the stakeholders embrace and disseminate ideas to those involved in the change process. Locally, the research results will provide stakeholders ways to determine DAP with regard to technology.

### **Evolving Mindsets**

Joseph and Reigeluth (2010) contended that one of the most important aspects of systemic change is facilitating teachers to change their attitudes and thoughts about education. Through this research, stakeholders and ultimately the early childhood staff, will be enlightened on strategies for identifying and embedding developmentally appropriate computer applications into the classroom. Consequently, there are potentially data that will shed light on differentiated instructional strategies for using technology in the early childhood classroom.

### **Systems View of Education**

In an early childhood program, for this study, all of the various educational systems form one interwoven entity. Joseph and Reigeluth (2010) contended that teachers need to create a realistic opinion of educational systems. The dynamics of the educational system should be viewed as a dynamic structure. One structure cannot operate by itself. Upon systemic change, stakeholders should recognize the interrelationships within the educational system (Joseph & Reigeluth, 2010). When implementing purposeful use of computer applications, early childhood teachers may be able to monitor student achievement.

Many teachers use computer applications as a choice for the children to interact with during free-play. Currently the haphazard nature of the implementation of computer

applications does not yield data driven decision making by the teachers. Through the systems view of education, stakeholders will be able to utilize this data to make more informed decisions.

### **Systems Design**

The process of systems design provides an avenue for the teacher to proceed from the current, outdated system of teaching to a better system of teaching (Joseph & Reigeluth, 2010). The systems design in the conceptual framework, evolves teachers a new way of planning, implementation, and assessment. Upon the completion of this research, stakeholders now have valuable insight on how teachers' perspectives are impacting the implementation of developmentally appropriate computer applications into the classroom. This insight facilitates potential professional development activities, future research ideas, and possibly instructional opportunities.

This framework of a change process provides educators with the foundation to achieve greater and sustainable changes. The goal of the change process is to improve our current educational system (Jenlink, Reigeluth, Carr, & Nelson, 1996). Understanding the relationship between the major elements for systemic change could lead to more appropriate implementation of developmentally appropriate computer applications in early childhood education classrooms.

Teachers have been inundated with computers and computer software application. The key is knowing how technology can be implemented in a systemic manner based upon Joseph and Reigeluth's (2010) elements of systemic change process. To solve the problems of the information-age demands on the education system, there is a need for

new intellectual tools (Reigeluth & Garfinkle, (1994). Through the data presented in this research, teachers' perspectives can provide insight on strategies for increasing purposeful and systematic implementation of developmentally appropriate computer applications.

### **Definitions**

The following terms are defined in an effort to ensure an understanding of terminology throughout the study.

*Change process:* developing a learning organization that has a better awareness of the educational change process (Joseph & Reigeluth, 2010).

*Computer applications:* applications that are utilized on computers, notebooks, SmartBoards, and/or laptops. Applications are what early childhood teachers use to implement instruction (More & Travers, 2013).

*Computer hardware:* refers to computers, laptops, and/or iPads.

*Developmentally appropriate practices:* its foundation is developed to advance young children's optimal development as well as learning through instructional strategies that are based on the research about how young children learn and develop through purposeful, effective early education (NAEYC, n.d.).

*Developmentally appropriate technology:* media and technology tools that are utilized in a variety of methods that capitalize on a child's innate interest to actively create knowledge, recognizing the diverse challenges offered by the child's level of development throughout all domains (Rosen & Jaruszewicz, 2009).

*Early Childhood Education*: education offered to children from ages 3 to 8 years old (Rosen & Jaruszewicz, 2009). Early childhood will encompass children between 3 to 5 years old.

*Integrating Technology*: the way in which technology is utilized as an instructional activity to support the activities of instruction (Brown & Lee, 2012).

*Systems Design*: the process of systems design provides an avenue for the teacher to proceed from the current, outdated system of teaching to a better system of teaching (Joseph & Reigeluth, 2010).

### **Assumptions**

In this study, I made several assumptions. In educational research, there are underlying assumptions, or factors are accepted as true minus concrete evidence (Ellis & Levy, 2009). For this study, I assumed that most early childhood teachers provide computer access to their students and that most teachers have basic computer training. I also assumed that the majority of teachers have a positive perception about using computers with their students, and that all early childhood teachers have a basic understanding of DAP. In addition, I assumed that participants were reasonably honest in responding to interview questions, and that early childhood students were capable of accessing the computer.

### **Limitations**

There were four limitations regarding this research study. Limitations of a study are the potential weaknesses or problems that are identified by the researcher (Creswell, 2012). The limitations of this study were: (a) limited number of potential participants, (b)



small sample size, (c) the continuum of computer applications may be too vast, and (d) that not all teachers used computer applications with their students.

In qualitative research, there are challenges in terms of transferability of results, as well as credibility and accuracy of data collection and analyses. Due to limitations that I described in the preceding paragraph, it may be difficult to demonstrate transferability to other settings. In addition, this study was limited to only teachers in early childhood classrooms in one district in the Midwestern section of the United States.

### **Scope**

The scope of this study was based upon teacher perceptions about the use of DAPs, while embedding technology into early childhood classrooms. During the process of this research, I interviewed teachers about their perceptions of DAP and embedding technology into their classrooms. Also, participants were asked about possible strategies for increasing developmentally appropriate computer applications in the early childhood classroom. A document analysis was conducted to determine the accuracy and credibility of the data.

The interview consisted of both demographic and open-ended questions with at least one probe prepared for each question. The interview data was then transcribed, analyzed, coded, and summarized through narrative or verbal means. I provided each teacher who participated with a copy of the findings for his/her own use. The participants were given the chance to discuss the findings with me. Conversations were offered to the participants, through email or face-to-face conversations if discrepancies were identified.

### **Delimitations**

Delimitations in research are factors that ascend from limitations of the research and by the conscious exclusion and inclusion actions developed as part of the study plan (Simon & Goes, 2013). In this study, I intended to examine teachers' perceptions of DAP computer applications. I did not investigate the computer software compatibility, developmentally appropriate computer access, such as the use of hand-eye coordination, or aspects of curricular modifications. The delimitations of this study were: (a) the use or nonuse of computers in the classroom, (b) the children in the early childhood classroom may be physically too small to have access to the computer, (c) administrators have not provided guidelines for DAP, and (d) there may be some negative feelings toward the lack of administrative guidance for the utilization of the computer.

### **Significance**

Early childhood teachers are using computers, Smartboards, and even tablets for learning opportunities. This infiltration of technology is not new, but how to systematically use this technology for DAP appears to elude novice and veteran teachers. Technology use can be found in all aspects of society, though computer use in early childhood classrooms and acknowledgment as a developmentally appropriate practice evades most classrooms (Paret & Quesenberry, 2010). Early childhood classrooms are inundated with computers, however developmentally appropriate computer applications that enhance student achievement are not in use. Developmentally appropriate technology enhances instruction via the use of activities, and interactions (NAEYC, 2009).

Using developmentally appropriate computer applications that provide students with educationally relevant and high quality content is a challenge. Wood et al. (2012) found the task of vetting the pedagogical and developmental appropriateness is in the hands of the teacher. A plethora of commercial software programs have been created to support instruction; however, these programs have not been formally evaluated for their effectiveness (Wood et al., 2012). The challenge of identifying developmentally appropriate software is broadened in the area of early childhood, as the search for multiple content areas such as; literacy, mathematics, science, and writing is a grueling task.

Preschool programs exist within multiple funding sources and teacher credentials whom in turn serve more than 1 million children between the ages of 3 and 4 (NAEYC, 2009). Recently, the educational push for preschool curriculums have been increased recognized, and has resulted in confusion over the boundaries between preschool and elementary schools (NAEYC, 2009). One source of pressure is the increased accountability requirements, especially benchmark testing of third grade students, which subsequently places increased demands on second grade students, to demonstrate the required proficiencies later (NAEYC, 2009). Social change is inevitable, however; implementing and creating systemic change requires a process.

The future of social change and integrating technology into the classroom is growing every day. With the proliferation of computer software, it is essential that teachers are prepared and have the philosophical skills and knowledge for effective evaluation, identification, and use of technology that is developmentally appropriate

(Allsopp, McHatton, & Cranston-Gingras, 2009; Ntuli & Kyei-Blankson, 2011). This integration of technology in the early childhood classroom is met with the challenge of utilizing developmentally appropriate computer applications.

Educators are also bound to high fidelity and evidence-based instruction within the classroom. These factors include, instruction that targets cognition, social, motor, and language skills for the purpose of enhancing students' overall development (More & Travers, 2013) . However, there is a question about the perspectives of early childhood teachers and the support and training needed to implement developmentally appropriate computer applications. The expectation for 21st century learners is that technology integration is used in ways that extend and increase their effectiveness (Ertmer & Ottenbreit-Leftwich, 2010). The problem is that school districts, administrators, and teachers need more research that provides how to use effective strategies while implementing developmentally appropriate computer applications.

### **Summary**

This study's foundation was based upon Joseph and Regeluth's (2010) conceptual framework of systemic change. Understanding the process of change provides teachers with a better understanding of how to implement DAP and its relationship to the cognitive development of students in early childhood education. Significance of this study was that early childhood education teachers may now have an increased recognition of the relationship between DAP and the development of their students. The outcomes of this study will provide for positive social change with the increased academic growth of

early childhood students when teachers have implemented DAP based upon the dimensions of systemic change.

## Section 2: Literature Review

### **Introduction**

In this review of literature, I based the discussion on the implementation of technology in early childhood classrooms. I focused on eight major components: integrating technology, developmentally appropriate practices, use of technology in the classroom, teacher preparation, professional development, advantages of technology in the classroom, barriers of technology and DAP, and possible solutions and versatility.

In the synthesis of the literature for each component, I focused on the trials and tribulations of implementing high fidelity and high quality instruction while managing the assimilation of DAP technology use in the early childhood classroom. In the summary of this chapter, social change opportunities is discussed for the future of DAP implementation of computers in the early childhood classroom.

I obtained the literature contained in this review through searches of databases including Google scholar, the Walden University Library, and ERIC. Specific search terms included: *early childhood, technology, developmentally appropriate practices, computer applications, and early childhood instruction*. Additional search terms resulted from the flowing combinations of terms: *developmentally appropriate technology in preschool classrooms, use of technology by early childhood teachers, and developmentally appropriate practices in schools*.

Despite the increased use of computers, computer access, access to software, and a wide continuum of technology for enhancing instruction, there is little evidence that early childhood teachers are implementing developmentally appropriate computer

applications. Ertmer and Ottenbreit-Leftwich (2010) revealed that high quality instruction is not being supported by technology. When teachers create appropriate learning environments in which technology is used and DAP for early childhood students, teachers can implement positive experiences for students (Keengwe & Onchwari, 2009).

The future of integrating DAP through technology into the classroom is growing every day. Students in early childhood classrooms benefit from acquiring skills and knowledge through the use of technology and should not be a replacement for hands-on experiences, instead as a teaching procedure to ideas, extended play, problem-solving techniques and learning (Dietz & Kashin, 2013; NAEYC 2012). The challenge of integrating technology into the early childhood classroom is met with an understanding of developmental education and psychology and applying that knowledge to the implementation of developmentally appropriate computer applications.

### **Background**

Educators are bound to high quality and evidence-based instruction within the classroom. As technology becomes increasingly merged into our classrooms, there is a need to examine how to promote purposeful and developmentally appropriate practices for early childhood students. Early childhood teachers are challenged to implement their knowledge of typical childhood development and high fidelity instructional strategies to carefully and intentionally determine and implement technology (Blackwell, 2013; NAEYC, 2012; Wood et al., 2012). Overall, early childhood education is facing numerous challenges to meet the needs of the increasing demands of their students

(Bruder, 2010). It is imperative to investigate how to implement DAP computer applications in the early childhood classroom.

### **Piaget's Developmental Theory**

Jean Piaget is best remembered for his theory of cognitive development. Central to his theory is the idea that children develop their own theories about learning based on interactions with people and the environment (Piaget, 1964). Piaget's research enlightened scholars on the development of cognition and that young children process knowledge in different ways than older children or adults. He analyzed the process of learning and described the different stages of the cognitive development of children's.

**Sensorimotor stage (Birth – 2 years old).** In the first stage of this learning theory, sensorimotor, the infant develops an understanding of him/herself and reality through interacting with their settings (Learning Theories, 2014). In the early childhood classrooms, it is typical to work with young children who demonstrate skills at varying levels. Some computer applications may provide cause-effect practice

**Preoperational stage (ages 2 to 4).** The child is unable to bring abstract thoughts together and require situations that are physical and concrete and items are groups by simple ways, especially by important characteristics (Learning Theories, 2014). The most common developmental stage represented in the early childhood preschool is children in the preoperational stage of this learning theory. High fidelity instruction is presenting children with an opportunity to interact with concrete items. Piaget classified children's interactions with materials and classification of their thoughts by analyzing interviews of how children found commonalities and differences in items (Wavering,



2011). Appropriate technology creates balance and enhances the offering of these materials in an early childhood setting (Copple & Bredekamp 2009; NAEYC 2012). The educational relevance of this stage in development is to recognize that children benefit from hands-on learning activities as it facilitates their cognitive development however, it also important to allow young children to playfully and creatively interact and explore with media and technology (NAEYC, 2012).

**Concrete operations (ages 7 to 11).** This stage of the learning theory is the timeframe in which children begin to think in abstract terms and to conceptualize logical structures that explain his physical experiences (Learning Theories, 2014). In a classroom of children, this stage of learning can be quite a challenge. Although, once again providing hands-on, real life experiences and offers relevance for students. Heo, Han, Koch, and Aydin (2011) indicated that this stage can be seen as a bridge between pre-logical thought processes and complete local thought. Instruction within the classroom at this stage of cognitive development again is best done with real-life, hands-on opportunities like cooking or science experiments. These types of activities give students first hand experiences with conservation, changes in appearance, and changes in states of matter.

**Formal operations (ages 11 to 15).** Cognition reaches its last stage in which the person no longer requires the use of concrete objects to make judgments (Learning Theories, 2014). The student is able to use hypothetical thinking and their cognitive processing is more like an adult. During this stage of learning, opportunities to draw on real life experiences and create new information can be used in the classroom. In the

formal operations stage, students are able to demonstrate a higher language level and articulate complex verbal problems (Heo et al., 2011).

### **Vygotsky and Social Constructivism**

Lev Vygotsky, a social constructivist, defined the concept of zone of proximal development (ZPD) as the hypothetical distance between what a child can achieve independently and can be achieved with maximum assistance (Kugelmass, 2007). According to Vygotsky, individuals use tools that are created from their culture, to facilitate their environments (Learning Theories, 2014). Schools traditionally have a teacher lecturing while students play an inactive role in learning. Vygotsky promoted children playing an active activity in their learning and that learning be a reciprocal experience.

Creating instructional approaches that enable all children's participation as active learners in their classroom in ways that enrich their lives, expand their experiences, and promote independence requires continual forethought by educators (Kugelmass, 2007). Educators need to perpetually keep each child's unique learning style, culture, interests, and developmental ability in mind when embedding technology into the early childhood classroom. According to Vygotsky, children do not learn through independent exploration, rather, children benefit from adult structuring the task (Vygotsky, 1978). This provides further evidence of the importance of the early childhood teachers' perspectives on embedding developmentally appropriate computer applications and use.

## **Integrating Technology**

Integrating developmentally appropriate computer applications in the early childhood classroom can be seen as a complex aspect of infusing technology into instruction (Brown & Lee, 2012; Keengwe & Onchwari, 2009). A current issue influencing the instruction of children in early childhood programs is the integration of technology into the curriculum and classroom (Mohammad & Mohammad, 2012). Early childhood curriculums should directly relate to the child and his developmental readiness (Mohammad & Mohammad, 2012). Early childhood educators must demonstrate strong skills for embedding developmentally, thoughtful, and appropriate uses of technology for efficient and effective instruction (Parette, Quesenberry, & Blum, 2010). High quality and high fidelity instruction includes the teachers' diligence in the implementation of DAP computer applications as a tool in early childhood classrooms.

The future of integrating technology into the classroom is growing every day. Cviko, McKenney, and Voogt, (2012) found that technology integration was influenced by teachers' understandings of organizational structure as part of stressful working conditions, which includes limited time. Evidence-based practices that result in data and documented student achievement are of utmost importance.

Burnett (2010) contended, a strong need for additional research into reading and technology in early childhood education and the investigation of children's use of a broader array of digital technologies. Using computers as an integrated part of early childhood curriculum continues to be supported by research (Ertmer et al., 2012; Mohammad & Mohammad, 2012; NAEYC, 2012). Early childhood teachers need to

recognize that DAP should be included not only in traditional teaching situations and should include a smooth transition of technology into the early childhood classroom (More, & Travers, 2013).

### **Developmentally Appropriate Practices**

Young children benefit from teachers who are adept at developmentally appropriate practices. McManis and Gunnewig (2012) defined technology to be developmentally appropriate, when the technology is responsive to children's unique needs and interests, ages and developmental levels, and the context of the social and cultural environment. Kugelmass (2007) stated that developmentally appropriate practices call for the preparation of stimulating, age-appropriate, and child-centered activities. National Board Certified teachers (NBC), in the area of early childhood, reported they understand and utilize the connected nature of all of their students' abilities to inform their practices in developmentally appropriate instruction (McKenzie, 2013).

Also, according to McKenzie (2013), NBC teachers indicated they incorporate DAP throughout their curriculum by using interventions for instruction that support individualized learning opportunities that fit the diverse needs of their students. Additionally, McKenzie (2013) concluded, NBC teachers believe they understand the symbiosis between the content of what is being taught and what students are learning, and that they guide their instruction in developmentally appropriate ways. It is the connection between knowing how to and actually implementing DAP via technology that eludes many early childhood teachers.

Managing instruction using developmentally appropriate computer applications, monitoring student success, and making sure each child is benefiting from the computer applications is a difficult charge. Mohammad and Mohammad (2012) content that for the successful integration of technology in early childhood curriculum, teachers should be familiar with young children and theories regarding how children learn. Professional development opportunities, training, and examples of how to efficiently and effectively implement computer applications should be available to early childhood teachers (Chen & Chang 2006a; Keengwe & Onchwari 2009; NAEYC, 2012; Parett, Quesenberry & Blum, 2010). Ultimately, teachers' computer skills and knowledge have limited use if the teachers are not trained on how to utilize technology to improve children's learning (Chen & Chang, 2006b). The basic principles of technology and offering free access to computer time does not ensure students are broadening their knowledge are achieving greater academic success.

Students benefit from computer access and a wide continuum of technology. There is a need to help teachers develop an understanding of techniques to use technology to facilitate meaningful learning (Ertmer & Ottenbreit-Leftwich, 2010). Technology needs to be developmentally appropriate and responsive to the developmental levels and ages of the children to their individualized needs (McManis & Gunnewig, 2012; NAEYC, 2012). Teachers who provide developmentally appropriate software will empower children to take an active role in their own learning (Lee, 2009). As an effective teacher, knowing how to use technology is just the foundation; giving

children the opportunity to benefit from developmentally appropriate software is a bigger task.

### **Use of Technology in the Classroom**

Twenty-first century early childhood classrooms are experiencing an increase in the access of technology, however; the use of developmentally appropriate practices continues to be a difficult charge (Parett, Quesenberry & Blum, 2010; Wood et al., 2012). Most early childhood teachers are using computers, Smartboards, and tablets in their instruction. These teachers demonstrate an enthusiasm in technology and offer their students opportunities to utilize the various pieces of hardware and software during structured and unstructured times. However, some teachers are unaccustomed to the complexity of the teaching task in addition to adapting to specific contexts (Mahmood, 2012).

Teachers are using a variety of instructional strategies utilizing different forms of technology. When teachers use forethought about technology and media integration it will provide for learning and relationships (NAEYC, 2012). Children at three years old are being exposed to an array of technology, yet it is important to recognize they are still developing socially, emotionally, and cognitively. At this crucial age in development, it is important that the developmentally appropriate technology be used (Ntuli & Kyei-Blankson, 2010; Wood et al., 2012). Student achievement appears to be dependent on teachers who are insightful, purposeful, and diligent in the implementation of the early childhood curriculum and instruction (Bose, 2009).

Access to computer applications appears to be at most teachers' fingertips. However, teachers are not provided with enough support to implement developmentally appropriate technology. Ntuli and Kyei-Blankson (2010) contend that the appropriateness use of technology and the extent that early childhood teachers understanding of the role of technology in their teaching is missing in the professional literature. The lack of regard for whether or not computer applications are facilitating student success is a concern. Plowman and Stephen (2005) contented that adults often viewed children's use of computers as play. Without regard for purposeful use of the computer, children's success or failure goes without documentation. However, there is evidence that positive learning outcomes for students are directly correlated with teacher quality (Chuang & Ho, 2011). The researchers continued, that technology is rapidly adopting a predominant role in education, world-wide. Turja, Endepohls-Ulpe, & Chatoney (2009) further acknowledged the importance of technology in the early years should be based on sound educational principles. A critical need identified for implementing DAP is the need for support for early childhood teachers in acquiring the knowledge and skills to determine appropriate ways to use technology with young children (McManis & Gunnewig, 2012, NAEYC, 2012; Simon & Donohue, 2011). Consequently, a concern is that early childhood teachers lack the support and training needed to know how and what to do with the technology.

### **Teacher Preparation**

Computers and a vast array of computer applications are used in early childhood classrooms daily. The need for teachers with technology expertise is acknowledged by

many researchers and educational leaders (Chen & Chang, 2006a). Teachers enter the classroom with a wide range of technology skills. Chen and Chang (2006b) revealed, almost 50 percent of the teachers reported feeling very comfortable with using a computer and using the Internet and 50 percent reported feeling at ease when they use computers with young children. Key areas for teacher preparedness with regard to integrating technology into the early childhood classroom. Chen and Chang (2006a) listed, (a) teaching for understanding, (b) implementing technology as a tool for cooperative learning, (c) learning how to use technology to support children's social and cognitive and social, (d) increasing teachers' ability to use technology for the creation of materials, lesson plans, and the completion of school forms. Students benefit from teachers who are prepared with variety of learning materials that are developmentally appropriate and aligned with the curriculum.

Allsopp, McHatton, and Cranston-Gingras (2009) contend, more research is needed for the consideration of the development of systemic approaches to implementation of instructional technology in teacher preparation. These researchers also determined that technology should to be explicitly taught for effective implementation of technology into teaching. Furthermore, teacher preparation programs should provide systematic approaches to the implementation of instruction technology so the effect of these approaches on student success can be assessed (Allsopp, McHatton, & Cranston-Gingras, 2009). Teacher education programs should include identifying the child's culture, background, and preparation for a developmentally appropriate approach for using technology (Rosen & Jaruszewicz, 2009). It is important for teachers to exhibit



strong advocacy for implementing informed decisions on technologies within the early childhood classroom.

### **Professional Development**

Professional development opportunities may assist in disseminating developmentally appropriate computer applications guidelines, supported practices, and cohort mentoring. Parette, Quesenberry, and Blum (2010) contended, educational professionals may be remiss when they do not embrace developmentally appropriate practices and that both pre service preparation and professional development trainings should be improved. This type of training for early childhood teachers could be accomplished with quality and purposeful professional development. Simon, Nemeth, and McManis (2013) reported, many administrators are angry because their plans for implementing technology were based on incorrect assumptions. Implementing new technology that will match the district's vision and mission should be discussed in professional development trainings (Simon, Nemeth, & McManis, 2013). Teachers need opportunities to ask questions and probe the research of curricula they are being asked to use in their classrooms (Cerniglia, 2012). Implementing DAP into early childhood classrooms has to be more than a theory, it needs to be done with fidelity based on sound decisions. There are a variety of supports needed to implement technology into the classroom such as; administrative, technological and professional support (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). However, one way to ensure teachers receive the aforementioned and research based information is to disseminate this information through professional development activities.

Sustainability of effective and efficient use of technology is dependent on educational stakeholders participating in continual professional development. Chen and Chang (2006) reported that when administrators are actively involvement their awareness of the value of technology training increases. Additionally, teachers and administrators benefit from in-person or online supported by their peers (Simon, Nemeth, & McManis, 2013). If teachers are not trained on how to select and utilize technology in correct ways there will not be a positive impact on learning and development (McManis & Gunnewig, 2012). The sustainability and fidelity of developmentally appropriate use of technology has as much to do with training teachers as it does not training teachers.

### **Advantages of Technology in the Classroom**

Computer applications do offer children another means to gain and demonstrate knowledge. “Recent research findings confirm that young children are not passive members of the digital world” (Rosen & Jaruszewicz, 2009, p. 162). Computers make it possible for children to experience virtual tours and opportunities to view situations in the real world, which they may not have the chance to view otherwise. One major goal in education is to prepare students to be successful in today’s technology driven society. Given the increasing importance of technology in the early childhood classrooms, it has become urgent to investigate the level of early childhood educators’ technological pedagogical content knowledge (TPACK) (Chuang & Ho, 2011). The opportunity to give children computer software applications to enhance their learning is a valuable tool. However, it is not apparent how teachers’ perceptions influence the use of DAP or differentiated instruction while using computer applications.

Educators use technology for a variety of purposes. The majority (75%) of teachers use technology do so because children enjoy using it (Simon, Nemeth, & McManis, 2013). The researchers indicated, 50% of educators use technology because they see it as helping them meet the goals of their program and 21% use technology because it is a requirement by their program. There is a correlation between adult guidance for computer usage and increases in students' planning behavior, visual-motor coordination, abstract reasoning, and visual memory (McManis & Gunnewig, 2012). These authors noted, when children are engaged with technology in peer groups or teacher-led activities can experience a powerful learning.

For children with diverse abilities levels, utilizing developmentally appropriate computer applications can be an advantage. Technology can be a tool to augment instruction for; processing, memory, recall, cultural experiences, and linguistic differences (NAEYC, 2012; Parette, Quesenberry, & Blum, 2010; Simon, Nemeth, & McManis, 2013). The use of technology supports inclusive practices and offers an enhanced teaching tool for children with special needs. When used thoughtfully, technology can empower children with unique needs to have increased social opportunities or differentiated instruction (NAEYC, 2012).

### **Barriers of Technology and DAP**

Barriers listed in the research for implementing developmentally appropriate technology into the classroom are, teacher perceptions, confidence, training, and conflicting professional views. Blackwell, Lauricella, Wartella, Robb, and Schomburg, (2013) reported that a teacher may possess the skills of how to use technology but this

does not always lead a teacher to believe in the value of technology. Teachers may find the task of utilizing technology too ambiguous. Plowman and Stephen (2005) found practitioners request additional training, assistance with identifying appropriate software, support with technology, and funds to increase pedagogical use of computers. Utilizing a SmartBoard instead of a chalkboard, an E-book instead of a printed book, or an online test instead of a paper-pencil test is not changing the method it is just changing the delivery and these are not examples of DAP technology use (Aslan & Reigeluth, 2013).

Additional research should identify effective techniques for the design and implementation of teacher tools for advancing student inquiry-based learning with regards to technology, the impact on student achievement (Plowman & Stephen, 2005; Wang, Kinzie, McGuire, & Pan, 2010).

For some teachers the laborious task of implementing developmentally appropriate computer applications may also seem daunting and overwhelming. Selecting developmentally appropriate software takes time and knowledge. Ntuli & Kyei-Blankson (2011) indicated, 51% of the teachers that they interviewed noted, the lack of time affected their ability to review and learn the software before presenting it to the children. The researchers also found the lack of time adversely affected the teachers' criteria for selecting the software. Although, software is frequently labeled with the grade level, this does not ensure it is developmentally appropriate. The fact that children can be in early childhood, but their language development is delayed, will change the level of appropriateness for each child (Ntuli & Kyei-Blankson, 2011). The variance in

developmental abilities within an early childhood classroom provides teachers with additional challenges when selecting computer software applications.

Also, there are conflicting professional ideas on the use of computers with young children. The American Academy of Pediatrics (2011) reported, children 0-2 years of age should have no screen time. However, The NAEYC (2012) concluded, screen time may be provided to young children, upon thoughtful integration of technology in developmentally appropriate manners. These two leading authorities on development in young children may lead to confusion among early childhood teachers.

### **Possible Solutions and Versatility**

Possible solutions for increasing developmentally appropriate technology in the early childhood classroom may be, changing the role of technology, changing the way teachers define developmentally appropriate technology, and increasing the level of teachers' skills to integrate technology into their classroom (Ntuli & Kyei-Blankson, 2010, Plowman & Stephen, 2005). These researchers also suggested a way to ensure that students are benefiting from technology is to have a system for documentation.

Computer applications are dynamic and multi-leveled in many cases. Ntuli and Kyei-Blankson, (2010) reported that to meet the needs of all students, teachers must be encouraged to use more programs that take into consideration students' differentiated experiences and skills. There are many opportunities for teachers to learn how to offer children with a variety of learning disabilities access to technology. The use of developmentally appropriate computer applications paired with a variety of ways for children with physical disabilities to access the technology. Finally, a possible solution

for integrating developmentally appropriate computer applications is to integrate curricular content that can be achieved using technology.

### **Conceptual Framework**

The structure used to assist school districts to engage in change is a process. In the past, school reform occurred through piecemeal change and was not enough to improve the overall system (Chen & Reigeluth, 2010). This typical response was for a school district to just fix-the-broken part. Although, for today's stakeholders to truly embrace social change, embedding DAP with regard to computer applications, through a systemic approach could bring significant improvements to the education experience (Chen & Reigeluth, 2010). Joseph and Reigeluth (2010) outlined the major elements for systemic change as (a) "broad stakeholder ownership, (b) development of a learning organization, (c) understanding the systemic change process, (d) evolving mindsets about education, (e) systems view of education, and (f) systems design" (p. 98). Educators who want to bring about fundamental change should understand each entity of the framework to support change.

There is a need for implementing these elements to bring change into the early childhood classroom for increasing purposeful and systematic implementation of developmentally appropriate computer applications. For systemic change to occur however, it will demand a fundamental rethinking or change in mindset. Changes need to occur in the way computer applications are searched for, purchased, implemented, monitored, and student data assessed. The importance of systemic change in these

processes for stakeholders and children it is critical that professionals develop effective guidance (Joseph & Reigeluth, 2005, Watson, S., Watson, W., & Reigeluth, 2008).

Joseph and Reigeluth (2005) used a qualitative research approach to test and change the process guidelines used for Guidance System for Transforming Education (GSTE). The researchers served as facilitators of change and investigated an initial stage of the process of systemic change. Through this research it is imperative that educators create effective guidance for stakeholders (Joseph & Reigeluth, 2005).

The transition to the information age requires educational leaders and stakeholders to use new instructional strategies. However, education is still based on the industrial age (Watson, S., Watson, W., & Reigeluth, 2008). The change that is needed is for children to have hands-on experiences. Also, for children to use developmentally appropriate computer applications that provide students educationally relevant and high quality content. For this to occur, it is important for educators recognize all six aspects of the systemic change process: (a) broad stakeholder ownership, (b) development of a learning organization, (c) understanding the systemic change process, (d) evolving mindsets about education, (e) systems view of education, and (f) systems design” (Joseph & Reigeluth, 2010, p. 98).

### **Summary**

The review of literature supports a closer, qualitative investigation of early childhood teachers’ perspectives. Ntuli and Kyei-Blankson (2011) identified, professional development, teacher support procedures, and teacher education programs as areas that need to be improved for increasing the use of developmentally appropriate

technology in the classroom. These authors went on to list regularly allotted time for lesson planning as an area that would facilitate increased use of technology in the classroom. However, there is a lack of research that identifies early childhood teachers' perspectives on embedding developmentally appropriate technology into the early childhood classroom. This is the most important opportunity to apply developmental principles when implementing current technologies (NAEYC, 2012).

One expectation from this study is to uncover common themes from the interviews of early childhood teachers that will reveal how to make DAP more available, accessible, and increase the fidelity of implementation based on the data. Another expectation is to have an increase in early childhood teachers' confidence and informed intentionality in selecting developmentally appropriate technology there will be an increase in innovative and effective early learning (Wartella, Blackwell, Lauricella, & Robb, 2013). The importance of fundamental change, or systemic change was also highlighted in this section. The conceptual framework for systemic change process will engage the school district in a paradigm change to help stakeholders implement DAP technology and computer applications into the early childhood classroom.



### Section 3: Research Method

#### **Introduction**

The purpose of this case study was to uncover the essence of early childhood teachers' perspectives on embedding developmentally appropriate use of computer applications in classroom instruction. Qualitative researchers use an inductive reasoning method, which systematically observes actions, searches for themes, and develops generalization from the analysis of those themes. Educational research is the backbone of evidence-based practices. A case study, specifically, is used by researchers to obtain holistic and meaningful characteristics of an organization, which contributes to the knowledge of organizational, group, social and related phenomena (Yin, 2009).

#### **Research Design**

The qualitative research chosen for this study was used to investigate participants' perspectives and ideas for social change toward the use of DAP while embedding technology. A strength inherent in qualitative designs lies in its search for unknown themes. The rich and thick descriptions and data revealed in qualitative designs provide a deeper understanding of the perspectives of people. Another benefit of utilizing qualitative research was the ability to do field research in a naturalistic setting. Case study research methodology is an empirical inquiry that examines a contemporary phenomenon (Noor, 2008).

A case study design was implemented for this research. The case study design is an in-depth examination of a bounded system based on exhaustive data collection and analysis (Creswell, 2012). An advantage of a case study is that it captures a round picture

since multiple sources of evidence are utilized in the data collection process (Noor, 2008). Noor (2008), continues to explain, case studies as being concerned with a particular issue within an organization.

A case study was selected for this research to answer the why and how for embedding developmentally appropriate computer applications in the early childhood classroom. According to Yin (2009), case study research is descriptive, exploratory, or explanatory. An exploratory design is a type of research that yields no single or clear set of outcomes (Yin, 2003).

Another possible qualitative approach that was considered was the phenomenological design. The phenomenological design was not used to investigate teachers' perspectives on DAP, because it requires the research to have a philosophical perspective (Creswell, 2007). A phenomenological approach requires prolonged engagement and multiple interviews, which would not provide appropriate data to answer the proposed research questions.

Quantitative researchers implement a hypothetical-deductive methodology. Through quantitative research, a research develops a hypothesis and the researcher collects and summarizes data. The researcher then determines the results generalizable to a larger population. A quantitative study was determined not appropriate to answer the research question in this study. This approach is not appropriate because I wanted to gain insight and gather an in-depth understanding about the teachers' perspectives on developmentally appropriate use of computer applications.

### **Research Questions**

The following research questions guided my study.

1. What are teacher perspectives about the use of developmentally appropriate practices while embedding technology into early childhood classrooms?
2. What strategies do early childhood teachers believe would be best to implement change toward using developmentally appropriate computer applications?

### **Research Review**

Steps to ensure a professional and ethical study were implemented prior to conducting the research study. Approval was obtained from the Walden Institutional Review Board (IRB) to conduct the study. Walden University's approval number for this study is 09-03-14-0302672.

Upon approval by Walden University's IRB, permission to conduct this study was obtained from the local school district. I completed and submitted a Request to Conduct Research Application (A) which included: (a) a summary of the purpose of the research, (b) a summary of the proposed research methods, (c), evidence that the research has been formally approved through a human subjects review process, (d) assurance from the researcher that principals and teachers are aware that they can opt out of participation without consequence, and (e) assurance that results will be communicated with district administrators upon the completion of the study. The application was submitted to the Director of Research, Evaluation, and Accountability.

Upon approval to conduct the research by the district's review team, the principal at the Early Childhood Center granted permission to interview early childhood teachers in their schools (see Appendix B). According to the school district's research review team, principals have the option to decline participation on behalf of their entire staff.

### **Informed Consent and Protection of Participants' Rights**

There are two major aspects in research that protect human participants. These include informed consent and protection of informants from harm (Bogdan & Biklen, 2007). These actions are important because they guarantee the participant certain rights and are a central concept in ethical research.

**Informed Consent.** Participants provided their informed consent, which included information about the nature of the research, the design, possible dangers to the subjects and any other relevant information (Bogdan & Biklen, 2007). The informed consent is a statement that those participating in the study sign prior to their participation (Creswell, 2012). One valuable piece of information to share with participants while obtaining consent is that their participation is voluntary and how long the interview may take (Bogdan & Biklen, 2007).

A letter was sent out, via e-mail, to potential participants (see Appendix C). The e-mail addresses were all obtained through the internal school's directory. This letter contained a description of the study, as well as, requested their participation. The potential participants then read the statement, and acknowledged that they had read the information and felt they understood the study to make a decision about their involvement. Replying to the email with the words, "I consent", I responded, via e-mail,

with the possible times and locations for the interview to be conducted. The participants were then provided with a copy of their signed informed consent at the time of the interview.

### **Methods for Protection of Human Subjects**

Protection from harm was of utmost importance in research so to maintain a high level of integrity and ethical considerations. Protection from harm includes physical and emotional harm. In the area of qualitative research, there is no treatment and occurs in the participants' natural setting (Lodico et al., 2010). Ultimately, as the researcher, whenever possible, I provided ways to deal with unanticipated outcomes (Lodico et al., 2010). I told all participants they were able to conclude the interview, if at any time they felt uncomfortable. Also, the participants were given a copy of his/her own data and the opportunity to review and discuss the findings with me for the purpose of member checking.

The participants in this study were provided protection from harm in several ways. First, Walden University's Institutional Review Board (IRB) was responsible for ensured that all student research complies with the their ethical standards and federal regulations. The IRB reviewed and approved the research proposal and monitored my compliance with ethical and legal standards (Bogdan & Biklen, 2007). Participants were given informed consent and assured that they were not put in danger from participation in the research. Upon receiving IRB approval from Walden University, approval from the district was obtained.

**Confidentiality and Protection from Harm.** The informants' privacy was viewed with the utmost respect and efforts for confidentiality and maintained. Early childhood teachers received an e-mailed letter from me, which described the nature and purpose of this study. Confidentiality was maintained whether correspondence was in writing and or through verbal reporting. All information collected during the course of the study was kept confidential.

I did not use personal information beyond the purpose of this study. Also, I did not include the participants' names or other information that could identify them in this study's reports. Participants were tracked using a numerical code to increase confidentiality (NIH Office of Extramural Research, 2011). Data will be kept secure by maintaining all interview question responses in a locked drawer in the researcher's home. As required by Walden University, data will be maintained for at least 5 years. A promise was made to the participants stating that I would not discuss any information collected during the course of the data collection period to anyone outside of my dissertation committee.

### **Role of the Researcher**

There is a perception that the researcher in qualitative research may present biases in the collection of data, by infusing their own preconceived thoughts and ideas (Long, 2012). However, I remained neutral and collected data without bias. Ultimately, qualitative research is not conducted for the purpose of generalization of data collected, but instead to produce evidence based on the investigation of specific contexts and individuals (Brantlinger, Jimenez, Klingner, Pugach, & Richardson, 2005).

The challenge was to collect, analyze, code, and interpret the vast amount of information. My role in qualitative research was to be the main instrument in a setting that is as naturalistic as possible (Szyjka, 2012). In this study, I was directly involved with the research. I am a speech-language pathologist in the district and have no direct supervisory role with any potential participants.

### **Participants and Setting**

After the principal agreed to allow her staff to participate in the study, I used purposeful sampling to acquire participants in early childhood, as well as, early childhood special education. All early childhood education teachers, including early childhood special education teachers, were offered the opportunity to participate in the research study via an e-mailed letter of invitation, including an informed consent form (see Appendix C). Teachers who desired to participate were requested to reply, via e-mail, stating their consent and willingness to participate. The first 10 early childhood teachers who agreed to participate created the research sample. I then contacted the participants, via district email, to set up 1:1 interviews. Each participant was assigned a code from 1-10. The interviews were conducted in a location that was comfortable for the participant and lasted approximately 30-45 minutes.

### **Data Collection**

An interview protocol was developed based upon Joseph and Reigeluth's (2010) systemic change process. The interview topics engaged the participants in a conversation regarding possible educational change (see Appendix E). Fostering open communication with educational stakeholders facilitates the identification of system relationships in

education (Joseph & Reigeluth, 2010). An expert panel of four early childhood teachers reviewed the interview questions. These teachers have earned tenured in the State of Missouri, which is acquiring 5 or more years of employment as an early childhood teacher, and identified as leaders in their district based on recommendations from peers or human resources. These early childhood teachers were selected from 3 surrounding school districts. They were contacted by e-mail, and asked for their professional input. Upon each participant's agreement, an e-mail that contained the potential interview questions was provided for their review. The participants' feedback was collected and applied as deemed appropriate. A final list of the potential interview questions was e-mailed out to the expert panel for one last review and request for final suggestions. The expert panel provided a level of social validity. The criteria for social validity involves the level of involvement by the stakeholders whom created the systems that influence success and independence (Scott, 2007).

The interview questions ascertained each participant's perspective on technology in their classroom. The participants were asked to describe their perspectives on developmentally appropriate practices and how that impacts their decisions on what computer applications they use in their classrooms. The interviews consisted of both demographic and open-ended questions with at least one probe prepared for each question (Appendix E). The probes were used based on the richness of the participant's responses. Additionally the participants offered strategies for facilitating change toward using developmentally appropriate computer applications. Another subject area in the



interview protocol was used to inquire about the participants' own training with technology. The above subject areas were all common entities in the review of literature.

Upon obtaining consent from the participants, the interviews were audiotaped and I wrote field notes during each interview. Field notes were created to assist the researcher to remember and record the behaviors, activities, events and other features present during the interview (Merriam, 2009). The author also listed these important details that should be included in field notes; (a) the date, time, location, and purpose of the interview, (b) the number of people in the setting and who is there, (c) a description of the environment, (d) use quotation marks when directly quoting someone, and (e) consecutively number the lines on the left to make data analysis easier. I ensure the field notes are accurate, organized, and descriptive.

Document analysis was also an integral part of the data set. Document analyses were used along with other qualitative research methods to compare and contrast data and were used as a means of triangulation (Bowen, 2009). The document collection included, but was not limited to, the local school district's both printed and electronic information on professional development activities on DAP, documents reflecting the funding for technology, and the school district's technology plan. By examining information collected through qualitative research methods, the researcher was able to corroborate findings across data while decreasing the impact of potential biases (Bowen, 2009).

## **Data Analysis**

Data analysis was the process used to systematically search and organize the interview transcripts and artifacts that were accumulated (Bogdan & Biklen, 2007). The preferred way of data analysis is to simultaneously analyze data during data collection rather than waiting to initiate that analysis until all the data is collected (Merriam, 2009). At the completion of the interviews, the audio-taped files were transcribed into a computer document. Patterns within and between categories were discovered during the data analysis to create categories. Taylor-Powell and Renner (2003) stated, as the data is organized into categories, patterns both within and between the categories will be uncovered. The categories that evolve were used to inform the central phenomenon (Creswell, 2012). Common themes were also analyzed for relationships with Joseph and Reigulth's (2010) conceptual framework for systemic change. The documentary evidence described above, will act as a method to cross-validate information gathered from the interviews (Noor, 2008).

Document analysis involved skimming, reading and interpretation of documents that were provided by the local district. The process of document analysis entailed content analysis and thematic analysis (Bowen, 2009). Initially, a content analysis of the documents sought convergent synthesis by organizing the information into categories related to teacher perceptions about the use of developmentally appropriate practices and strategies for improving their implementation. Thematic analysis involves a careful, focused review of the documents (Bowen, 2009). I reviewed the documents and created codes and categories based on data gleaned from the analysis. Objectivity and

sensitivity was adhered to for the purpose of representing the data fairly. Fairness is viewed as the balance of the participants' views and that there is representation of all constructions and the values that undergird them (Schwandt, Lincoln, & Guba, (2007).

### **Validity and Trustworthiness**

Validity of the findings were determined through the accuracy and credibility of the findings through member checking (Creswell, 2012). Authenticity through member checking was completed after transcribing of the data, coding, and the data analysis. This process was used to determine the accuracy of the researcher's understanding. Member checking increases the validity of the findings and assures accurate interpretation of the data (Creswell, 2012). I collected data through interviews and document analysis. The interview data was then analyzed, coded, and summarized through narrative or verbal means. The participants were each provided with a copy of the findings with their own data for review. Follow-up conversations were offered upon participants finding any errors. Triangulation of data was completed through review of interview data and document analysis. This contributed to the accuracy and credibility of the study (Creswell, 2012). During the interview sessions, my own views or opinions were not discussed. I was self-reflective about my role during the entirety of the research.

I am aware of my own bias toward DAP and technology use in the early childhood classroom. It is my belief that teachers should have a strong commitment to developmentally appropriate practices. I believe there are factors that adversely affect the implementation of DAP. It is my opinion, that the lack of planning time, the lack of importance administrators put on DAP in the classroom, and lack of resources influence

the implementation of DAP in early childhood classrooms. Efforts were made to put aside my personal opinions and beliefs in order to avoid influencing the participants during the interview. This was accomplished by the use of the methodological practice of bracketing which is the deliberate putting aside of my personal beliefs regarding the implementation of DAP. This practice increased the validity of the data collected and analysis (Tufford & Newman, 2010). Through bracketing I was aware of my own bias and presuppositions regarding developmentally appropriate practices.

### **Summary**

The purpose of this study was to determine early childhood teachers' perspectives on embedding developmentally appropriate use of computer applications. Qualitative research as defined above, which systematically observes phenomena, searches for patterns, and develops generalization from those themes. By understanding teachers' perspectives data provides insight on how and why DAP are not being implemented. The data has also resulted in information that stakeholders can utilize for professional development activities and potential areas that need additional funding. The challenge of how administrators and teachers manage developmentally appropriate computer applications, monitor student success, and demonstrate the benefit of technology as an instructional tool continues in today's early childhood classrooms.

## Section 4: Results

### **Introduction**

The purpose of this study was to identify early childhood teachers' perspectives about the use of developmentally appropriate computer applications within their classroom in a large urban school district. Through a qualitative case study approach, 10 early childhood teachers were interviewed. A document analysis was conducted to determine the accuracy and credibility of the data. The following research questions guided this study:

1. What are teacher perspectives about the use of developmentally appropriate practices while embedding technology into early childhood classrooms?
2. What strategies do early childhood teachers believe would be best to implement change toward using developmentally appropriate computer applications?

The intended outcome of this case study was to provide the researcher, the local stakeholders, and early childhood teachers with knowledge and potentially strategies on embedding developmentally appropriate computer applications into the classroom. Joseph and Reigeluth (2010) explained, education stakeholders included the individuals in the community that have an interest in the education of students in their community. This study's foundation is based upon Joseph and Reigeluth's conceptual framework of systemic change process.

### **Process for Generating Data**

An expert panel of four early childhood teachers reviewed the interview questions. These teachers have all earned tenured in the State of Missouri, with 5 or more years of employment as an early childhood teacher, and were identified as leaders in their district based on recommendations from professional peers. The early childhood teachers were selected from three surrounding school districts.

The teachers were contacted by e-mail, and asked for their professional input. Once all the participants agreed, an e-mail was sent which contained potential interview questions which were provided for their review. The participants' feedback was collected and applied as deemed appropriate. A final list of the potential interview questions was e-mailed out to the expert panel for one last review and request for final suggestions.

The expert panel provided a level of social validity. Feedback suggested listing technology options for lower functioning students. Overall, the feedback was positive and affirmed the questions were appropriate. The criteria for social validity involves the level of involvement by the stakeholders whom create the systems that affect both success and independence in positive ways (Scott, 2007).

After receiving confirmation from the Institutional Review Board (IRB), with approval number 09-03-14-0302672 on September 12, 2014, an e-mail (see Appendix C) was sent to all early childhood and early childhood special education teachers. On September 22, 2014 a total of eight participants had replied to me, agreeing to participate in the study. In an attempt to acquire 10 total participants an additional e-mail invitation

was sent on September 26<sup>th</sup>, excluding any early childhood teachers that had already responded. By October 3, 2014 two additional participants, for a total of 10, had indicated their consent to participate.

The e-mail invitation (see Appendix C) explained the procedures for the interview, the voluntary nature of the study, the risks and benefits of their participation in the study, an explanation that there would be no compensation for participating in the study, a description of privacy, and the statement of consent. Upon receiving a reply to the invitation, indicating the participants' willingness to participate, I responded immediately requesting the best time, date, and location for the interview.

### **Data Collection**

The audiotaped semistructured interviews with each participant were conducted in an agreeable, neutral and private location between September 23<sup>rd</sup> and October 9<sup>th</sup>, 2014 and lasted from 25 minutes to 50 minutes. The interview included basic demographic questions and open-ended questions (see Appendix E). Open-ended interview questions focused on the participant's perspective on technology in their classroom, their perspectives on developmentally appropriate practices, how that impacts their decisions on what computer applications to use in their classrooms, as well as, their training with the use of technology in their classroom. Additionally, the participants were also asked to suggest strategies for facilitating change toward using developmentally appropriate computer applications.

To ensure validity and reliability, I audio-taped the interviews and personally transcribed the audio recordings. The participants were each given a copy of the findings

with their own data for review for the purpose of member checking. The system of member checking increases the validity of the findings and assures accurate interpretation of the data (Creswell, 2012). Nine of the participants did not have any changes or comments. One participant pointed out a few typos and provided a clarification to her teaching certification. None of the participants requested follow-up conversations.

The process of document analysis included numerous emails with the Office of Curriculum and Professional Development, two unanswered e-mails to the Executive Director of Instructional Technology, a search of board meeting agendas and notes, and personal communication. The purpose of the e-mails was to request (a) any guidelines or checklists for utilizing developmentally appropriate computer applications for Early Childhood, (b) obtain documentation of professional growth classes (PGC)'s that have targeted implementation of computer applications and/or technology in the last 3 years, and, (c) to gather documentation of the district's process for deciding what computer applications the district "approves" and more specifically, who approves, how are they approved, if there is a "list" of approved applications, and inquire as to whether there was a district policy in place for the aforementioned.

Document analysis was also conducted by researching the school district's BoardDocs, documents shared from the Office of Curriculum and Professional Development, and documents from school leaders. Documents that I obtained included:

1. Two receipts for the purchase of Teach Smart Learning Systems (SMARTboards and accessories) dated 2009 and 2010.



2. Three syllabi from district's professional development session titled, Summer Academy.
3. Personal e-mail communication from the Early Childhood Principal.
4. School Board agenda from June 21, 2014.
5. A district mass e-mail dated September 23, 2014 referencing technology plans.
6. Personal communication via e-mail from a coordinator at the district level for Instruction and Technology.

### **Participants**

Ten teachers were interviewed for this study. Three participants were early childhood teachers and seven participants were early childhood special education teachers. There was a range of years of teaching in early childhood of the participants. Four participants had 1-5 years of experience, two teachers had 5-10 years of experience, two had 11-15 years of experience, and two had 15 years or greater. Six of the participants had experience as teachers with other age groups. None of the participants had training on implementing computer applications into an early childhood classroom in college.

### **Systems for Tracking Data**

All interviews were transcribed into a Word document and saved according to their participant code 1-10. Field notes were taken during each interview and maintained in a spiral bound notebook. Each interview was then put into an Excel worksheet. Each interview was saved with the corresponding participant code.

During this phase of the data analysis, four columns were created to facilitate the discovery of patterns within and between categories. Taylor-Powell and Renner (2003) supported this step when they stated that as the data is organized into categories, patterns both within and between the categories would be uncovered. The categories that evolved were used to inform the central phenomenon (e.g., Creswell, 2012). The first column was used to collect keywords or thoughts. This column was used to account for common themes that were analyzed for relationships with Joseph and Reigulth's (2010) conceptual framework for systemic change. The first column had one or more themes associated with each participant's responses. For example, Participant 2 responded:

I feel like the things we have now, need teacher direction, instruction of how to do it, how get it going, and how to manage it. It's that piece of, a lot of times trying to use the technology, there's a glitch, the server goes down, or something goes wrong and then that becomes another issue of how to use it appropriately for that age group when they can't get themselves out of it.

was coded under technology integration, funding/resources, and evolving mindsets.

The second column was used for rewording the idea taken from the participants' responses or rephrasing for the purpose of finding common threads of information. The third column was used for coding the response to the research questions for this study. According to Creswell (2007), qualitative researchers need to analyze data from the beginning to the end of the data collection process.

For document analysis, documents were save to a protected jump drive as a PDF and printed out for review. I used four highlighter colors to create a visual organization

for information. Bowen (2009) explained that in document analysis data must be reviewed to determine meaning, to gain clarity, and to create empirical facts. I used pink to indicate financial investments or funding information, orange for any future plans the district has made for technology, blue for current technology plans or policies, and purple for training or staff development information.

### **Findings**

The research questions for this study were designed with the goal of understanding the perceptions of early childhood teachers with regard to developmentally appropriate computer applications. Through data analysis, exploration and coding of the data yielded patterns and connections within and between categories, which provided insight on how to improve the fidelity of instruction by embedding developmentally appropriate technology into the early childhood classroom. The following data gives breadth to the current research on teacher perspectives.

#### **Research Question 1**

The first research question was: What are teacher perspectives about the use of developmentally appropriate practices while embedding technology into early childhood classrooms? According to the data collected, six common themes were uncovered through data analysis. The first common thread was the integration of technology into the early childhood classroom. All ten participants use technology in their classrooms. The frequency, purpose and manner of access did vary between participants. The following data were revealed.

**Integration of technology.** All participants use technology in the classroom, but the frequency at which they use the technology varied between participants. Participant 1 stated:

We use the SMARTBoard every day. Most of our lessons are done on our SMARTBoard, we do our calendar on our SMARTBoard, we do our animated literacy, we do songs, we do programs like Go Noodle, which is like Brain Breaks, we do all sorts of things on our SMARTBoard.

Nine participants explained that they use the SMARTBoard as an integral part of their circle time activities and use it for activities like calendar and attendance activities.

Participant 6 stated:

I use a SMARTBoard daily, we use our large group, like with the big paper and how you would do the morning message, we do everything on SMARTBoard. We have our morning message on there, we have 2 sessions, so we also have the afternoon message on there, the calendar, the weather, and the friend counter, all of that's on there.

Participant 8 stated:

The SMARTBoard, that's used during circle time, and sometimes group time, it has our circle time routines, the songs are on there, where the kids are able to interact, touch things and each have a turn being a part of the group.

In contrast, Participant 9 stated, "This year my classroom dynamic is such that I have not used the SMARTBoard hardly at all. They cannot sit in a seat and get information from

something that is that far away.” Although all of the participants use technology in the classroom, the purpose for which they use the technology varied between participants.

Participant 1 explained that they now have an iPad in their classroom:

We use an iPad to work on letter recognition, we will work on some other concepts, but right now that’s our big focus right now is recognizing letters and writing the letters. We will do some number stuff, shapes, colors, that kind of thing.

Participant 4 stated:

We do the letters, the ABC’s, there’s also some color ones on there (SMARTBoard). There’s also some good songs on there that you can do thematically. Beginning reading, I’ve had some kids that like the beginning reading, the rhyming stuff, and the letters primarily is what we use.

Letter recognition and pre-academics was a reoccurring purpose for using technology.

Participant 6 explained that she uses technology for the purpose of enhancing instruction:

Well, all of them (forms of technology) are just aids with instruction, so if I am teaching a certain lesson. I may bring up something on the iPad or SMARTBoard that just enhances that. Because some kids are visual learners and it’s exciting for them to see that on the SMARTBoard. If they’ve already heard about it and touched objects and then they can see it, it just aids in instruction.

The participants have children in their classrooms with a wide continuum of ability levels secondary to English language learners and children with special needs. The participants with special education students explained how children access technology in their

classrooms. All participants listed the touchscreen as one way children access technology in their classroom. Participant 2 stated, “Pretty much touchscreen, or using a pointer, or a ball to access stuff, depending on their ability.” Participant 3 stated the mouse is pretty hard for young children to manipulate:

They use a mouse if they use the desktop computer. But like I said, unless they’re familiar with it they’ll try to swipe the screen, so it’s a lot more difficult. But after we work with them and show them the mouse they get pretty good at it. We have kids that have difficulty with fine motor skills, so using a mouse is pretty tough. Whereas using an iPad or SMARTBoard is much easier.

Participant 7 stated the children access technology in the following manners,

“Touchscreen, hand/pointer, and the SMARTBoard has pens that the students use sometimes to write on the SMARTBoard. The iPad has a touchscreen. The desktop has a mouse.”

**Knowledge of developmentally appropriate practices.** Developmentally appropriate practices are based on the research and theories of how young children learn and they develop and current knowledge of the effectiveness of early educational programs. Its foundation is developed to advance young children’s capacities to learn (NAEYC, n.d.). All participants provided their interpretation of what developmentally appropriate practices means. This study is based upon Joseph and Regeluth’s (2010) conceptual framework of systemic change. Understanding the process of change provides teachers with a better understanding of how to implement DAP and its relationship to the cognitive development of students in early childhood education.

However, first it is important to uncover teacher's perceptions of what DAP means to them. Eight of 10 participants referred to DAP as meeting the child at their developmental level. Participant 10 defined DAP as, "Tailor an activity to the child at their level and working 1:1 with them." Participant 5 explained, "Developmentally appropriate practice is at the kid's level and not necessarily at what age range that they need to be at. It is just hitting different benchmarks as they progress in their development." Participant 7 stated:

It means meeting the kids where they are in order to meet the grade level expectations. To do what is developmentally appropriate. Meeting the children where they are in order to advance, to be successful, to have functional skills, throughout their lives, and not necessarily their chronological age, but their developmental age.

Participant 8 explained:

That it is on their level and that it is appropriate for their understanding for whatever level they are regardless of their chronological age. It is where their level of understanding is at that it's something that they can be successful at. Or it's something that they are about to learn that's capable of understanding to some degree.

Participant 3 responded with a little different viewpoint:

You need to look at typical development for that age. So if they're 3,4,5 year olds, what's typical for that age. For our population and you know, looking at what they're specific needs are and how they learn. Are they visual learners or do they

need to touch. I think most kids need to do all of it. Definitely we know that people learn differently. I think looking at that. So giving them a lot of differentiated instruction, giving them lots of options to explore things, visually, hands-on, and hearing it helps them learn better.

All of the participants recognized the importance of DAP. Participant 4 stated: “Meeting each child where they’re at, what is appropriate for their needs. So, say I have a 4 year old, but they’re functioning at a 6 month old level, then I have to meet them where they’re at.” When asked if it helps or hinders instructional decisions, by know the child’s developmental age, Participant 3 responded, “It helps because all kids are different. We know, it’ll all student centered. It’s not just about me putting a lesson out there. It’s about what they need as students.”

**Technology in the early childhood classroom.** All 10 participants have SMARTBoards in their classrooms and at least one other form of hardware. The other types of technology used in the classrooms were iPads, desktop computers, Leap Frog hand-held devices, augmentative communication devices, Hatch computers, and Tag Readers. The participants also explained the different types of software they utilize in their classrooms. Participant 1 described the use of technology in her classroom:

Ok, we use the SMARTBoard every day. Most of our lessons are done on our SMARTBoard, we do our calendar on our SMARTBoard, we do our animated literacy, we do songs, we do programs like Go Noodle, which is like Brain Breaks, we do all sorts of things on our SMARTBoard. Ummm, involving you know, learning letters, working with animated literacy all of those things. Umm,



we do that with both groups. We also use the Hatch computer and one student a day, well 2 students a day, one in the morning and one in the afternoon, can go to a computer as one of their developmental centers and they do the Hatch program which tracks their umm skills levels in English and math and then we can go print out reports to let us know where they're at.

Participant 8 listed the SMARTBoard as a piece of technology that is used daily. Also, "We have a computer, a desktop, but we don't use it very often." Participant 3 explained:

I use the SMARTBoard, I use my (personal) iPad, I've put several apps on there, just early learning/education apps and autism apps, desktop computer, although the kids have more trouble using that because of the mouse, they use mostly tablets and iPads now, so they want to swipe the computer screen instead of using the mouse or arrows or things like that. The iPad is a little more user friendly for the kids.

One out of the 10 participants reported rarely using her SMARTBoard, Participant 9 stated:

This year my classroom dynamic is such that I have not used the SMARTBoard hardly at all. They cannot sit in a seat and get information from something that is that far away. So I have used more of the hand held devices, too either, in small groups work on, like give it to them for some individual learning while I work 1:1 with tangible items with another student. Or used it as a teaching tool like sometimes I will get the iPad, and we will use apps to teach handwriting, like instead of circle time right now. I'll use the apps to teach handwriting without

tears. I will have that as an activity instead of doing it as a SMARTBoard activity I'll do it in small groups with something that is more tangible.

In addition to the SMARTBoard, Participant 6 talked about what technology she uses in her classroom for the purpose of instruction:

We also have the touchscreen computer, the I Start Smart, which they can choose during centers, but they can also choose the SMARTBoard during centers, which is usually on Star Fall, and some other educational websites. I have also created several matching games and things through the Hatch software that we've had a couple of years that they utilize as well.

***Software and applications.*** The participants reported using a variety of applications and software in their classrooms. They also provided ways in which they found the applications and software that are used in the classroom. All of the participants reported utilizing SMARTNotebook, a software program utilized on the SMARTBoard. All of the participants also explained that they do searches on the Internet to find applications to use in their classroom as instructional tools or supplemental activities. One of the ten participants reported that she does research to find apps for her students to use. Participant 7 stated:

I actually read different articles on what other teachers are using. I went to the Apple website and they had different stories from real teachers who have implemented and are using technology in their classrooms and their top choices is what I started using mostly with my students.

Five of the 10 participants used applications based on the fact that they are free on the Internet or applications or software that are provided by the district. Participant 1 stated:

Right now we're just using whatever is free that matches with what skill level we're working on. So if we want to work on letter naming, I find some applications that are free, make sure they're appropriate, and it's not anything that's inappropriate, and educational and then that's what we use.

Several participants were unaware of any lists or resources for finding developmentally appropriate applications or software. Participant 5 stated:

The applications are decided on by what is offered by the district. I feel that there is more applications that we could use for the kids, but they are not available to use currently. The district will decide if we get SMART Notebook, if the lease runs out on a program and we can't use it anymore. So it is all based on what the district feeds to us for the most part.

Participant 2 reported, "Right now it's what is available through the district. Our computers in our classrooms don't work, so that eliminates any desktop stuff."

**Training and staff development.** None of the participants reported getting training on implementing technology into the classroom while they were in college.

Participant 10 explained her computer training in college, "That was very limited. We had one class called, computer for teachers. I learned how to use Word and Excel."

Participant 4, "I don't think I had any classes in college (on implementing technology). I don't remember anything." Participant 3 reported her training in college:

Oh, very little. We used them, we typed papers on them, but it was right when typewriters were going out and computers were just coming in. For my masters I did it online and we used computers to do like, accessing school programs, PowerPoint and presentations.

Technology training or staff development while being employed in the district ranged from none to just a little. The local school district just signed a lease with Mac beginning the Fall of 2013. All employees in the district were provided with basic training on MacBook Air. This training was for the purpose of word processing, e-mail, and basic technology tasks on the Mac. All participants acknowledged receiving this training. Participant 6 explained:

We got a little bit (of training), about this is how you log into the Portal, this is how you use your user id and password, and we got about an hour training on the MacBook Air, that wasn't a lot, but for me that was important because I've always been a PC person, I really still am. If I don't know how to do it, I Google it.

Participant 2 stated, "So not any formal training, other than when we got our Apple laptops. This is how you get in and this is what you do. That's pretty much it."

Four of 10 participants reported participating in the Summer Academy offered by the district for the purposed of professional growth training. Participant 5 explained:

One type of PGC (professional growth class) they offer is during the summer. That is one that they advertise a lot. It is called Summer Academy. They have two different sessions of that. One in June and one in August right before school

starts. I feel those two sessions are highly advertised and there is a lot of emphasis on those, but throughout the year they have classes as well, but to find out more information on those, it is really up to the individual learner who wants to find out.

The participants that had taken Summer Academy classes agreed the integrity of the instruction was good. Most of the participants agreed that they would take Summer Academy classes in the future. Only one participant stated that she would actually use what she learned from her sessions in her classroom. Participant 10 stated:

I went to Summer Academy; I took several of the technology classes there. I took one on how to make iMovies and then getting familiar with your Mac. And all the different things, the Mac brought a lot of technology to our classrooms. Being able to make books on it. I do all of my own voice recordings on it. That's about it. We haven't had a lot of technology training.

Although the Summer Academy offers valuable opportunities for professional growth three of the four participants who attended the classes did not report the curriculum targeted early childhood students or implementing DAP with regard to technology.

Participant 3 reported:

I've taken a couple classes through the Summer Academy that were technology based and we learned how to make movies. It's one of those things that you have a couple hours to walk through it and there's not a lot of time to ask questions. I haven't really used it again. It's not really geared toward early childhood, which

is what we need. The Summer Academy trainings are really geared toward middle school / high school kinds of programs and also for elementary.

Participant 9 also participated in the Summer Academy and took a class on iMovie and iPhoto, but none of the curriculum targeted training for the purpose of implementing DAP computer applications into an early childhood classroom.

Two of the 10 participants have taken professional growth classes that are offered by the local school district. Participant 5 explained:

Once or twice throughout the year they (the school district) will send out an e-mail letting you know that you can go onto the website, and look things up. We have another website called that you have to go to called, [mylearningplan.com](http://mylearningplan.com), through that they have a district catalog that you can click on and go through see which ones are available. PGC's are taught by staff from the district that may be excelled in something or have lot of knowledge on it that they want to share with other staff members in the district.

Participant 8 had a positive experience through a PGC:

I took a PGC. Another elementary teacher lead the class. We made some activities that we could use in our own class and got to see what other people were making. We got to play around with different games and activities that you could make on the SMARTBoard.

Overall, only one participant reported not taking any type of professional growth classes or staff development with regard to technology. Participant 6 stated, "If I don't know how to do it I Google it."

Five of 10 participants have received training on how to use the SMARTBoard. In 2009, the year the SMARTBoards were purchased, a part of the initial purchase agreement was for the teachers to receive training. The participants used the terminology ‘Hatch’, ‘SMARTNotebook’, and ‘SMARTBoard’ interchangeable throughout the interviews. Participant 5 reported, “The only training I have had is through SMART Notebook when we first got the SMARTBoards into our building. And that was simply using the toolbar and using showing us some tricks. There has not been much training.” Participant 2 explained:

When we first got the SMARTBoard and got the Hatch software we were trained by Hatch for a couple of times. They were on call and you could call them to get things ironed out. It was supposed to be once a month, but it turned out to be a couple times a year, for one year. Pretty much the package that they bought with our SMARTBoards, the Hatch stuff, was for children ages 3,4,and 5 year, so it was supposed to be developmentally appropriate for their ages.

Most of the participants reported getting very little training on how to implement instructional strategies or developmentally appropriate applications with the SMARTBoard Participant 4:

It’s been learn as you go with the SMARTBoards. We got a little bit of training when we got the Hatch when the SMARTBoards came. Where to find places on it, pretty basic, how to turn it on, turn it off. As intense training, I haven’t gotten anything through the district.

**Funding and resources.** Funding was a common theme in most of the interviews. Several participants discussed funding for the purpose of acquiring hardware, software, computer applications, training, and maintenance. The lack of funding limits the variety of technology in the classroom. The lack of funding also is a barrier for acquiring developmentally appropriate computer applications, training, and maintenance.

**Hardware.** Funding for the early childhood classroom is different than for school-aged classrooms. Participant 1 stated, “I would say first off they need to have a technology fund for the early childhood program. Our funding that we get, we can’t use it to buy any kind technology, computers, iPads that all goes through district office.”

Participant 4 stated,

I think it’s great (technology). I think if we could use it more. We have a lot of kids that are visual learners and would benefit from more use of technology, but it’s just not here for us other than the SMARTBoards to use. I would like to utilize it (technology) more, if I had more availability. If there were more things in the room that we could use that would be great.

**Software.** Most computer applications offer a free sample of their application. To obtain the full version of the application is requires a fee. Participant 1 stated,

Right now we’re just using whatever is free that matches with what skill level we’re working on. So if we want to work on letter naming, I find some applications that are free, make sure they’re appropriate, and it’s not anything that’s inappropriate, and educational and then that’s what we use.

Participant 4 explained:



I've had to buy all my own apps. And the problem is the free apps only give you a part of the app, so you want to see it all, so you go back in and buy the whole app. I've spent quite a bit of (my own) money.

**Computer Applications.** Participant 10 clarified that she uses her own money to pay for computer applications, "I do it, it's all out of my pocket. A lot of them are free. All of the Fisher Price ones are free. Some of them are a little pricier, \$5, \$6, \$7."

Participant 1 explained:

Right now we're just using whatever is free that matches with what skill level we're working on. So if we want to work on letter naming, I find some applications that are free, make sure they're appropriate, and it's not anything that's inappropriate, and educational and then that's what we use.

Participant 3 mentioned that she has her own iPad. She reported that she buys her own apps, but thinks funding is an issue that impacts the use of developmentally appropriate computer applications. Participant 3 explained:

I've had to buy all my own apps. And the problem is the free apps only give you a part of the app, so you want to see it all, so you go back in and buy the whole app. I've spent quite a bit of money.

She went on to explain, "I know we have funds that are put to good use, but I think there's always ways to put funds in different places, so we help children learn."

**Funding for Training.** Most teachers recognized the need for more training.

Four of ten participants specifically stated the need for more funding for the purpose of

training educators on technology implementation. Participant 2 stated, I don't think there's enough training for us to be able to use it (technology)." Participant 4 reported:

I would also like to see our principals help us with some training. I think that a lot of the activities that we do are limited, because we don't have additional training. Teachers may explore on their own, but it's important to have the different training. I know that the training does costs money and I think that principals would have to factor that in. But I know there is money out there and I know a lot of them can find it. So if we could definitely look at more training.

***Maintenance.*** Participant 2 reported:

We don't have immediate access to somebody to come out and help you. You can call the help desk, but if it's not something they can help you with over the phone, then you have to file a work order.

She went on to explain:

I think that all of our buildings need to have their own IT person. As much technology that we are getting in, I just think that would be a better utilization of those staff people, is to be hands-on and in the buildings.

Participant 5 stated, "Replacing some of the outdated technology that we have. We have different things, but they may not get used because they take so much time. So looking at the monetary value of replacing some things or fixing them."

### **Advantages and Disadvantages of Technology by Early Childhood Teachers**

All participants reported positive feelings toward having technology in their classrooms. Most participants feel there is a true advantage to having technology in the classroom. They also described disadvantages of technology in their classrooms.

**Advantages of technology in the EC classroom.** All participants reported using technology in their classroom. Nine of 10 participants reported advantages to having technology in the classroom. These responses varied from providing an additional instructional tool to using it as a reinforcer. Participant 4 stated:

I think it's great. I think if we could use it more. We have a lot of kids that are visual learners and would benefit from more use of technology, but it's just not here for us other than the SMARTBoards to use.

Participant 5 reported, "The kids nowadays learn so much better through having that technology as an opportunity to show what they know." Participant 5 continued, "I feel like it (technology) can help support it (learning), because some kids that are non-verbal it really helps show what they know. They can manipulate things on the screen and move things around without having to verbally state things." Participant 6 listed several advantages of using technology in the classroom. She explained how the SMARTBoard accentuates her instructional tools:

It's living text on a computer it's living; it's not just a document that is just going to sit there. That's my opinion. I know you can do that with chart paper, but you can easily tweak it, you can erase it, the kids can write all over it. You can

screen-shot it and erase it for the next class. For me it's more feasible to do it like that. There are times when; we call it "old schooling it."

Participant 7 reported:

I think technology is a valuable instructional tool. I think it is where we are headed, as far as, if you look at the technology that they give middle school and high school students. Those students are provided with Mac Books and Chrome Books. So, I think that using it in early childhood is important.

Participant 6 stated, "We are a technological society. I think we are doing a disservice to the kids if we don't use technology." Participant 8 reported:

I think a con (of technology in the early childhood classroom) is to just make sure that technology isn't used too much and to make sure there are still hands-on things where the kids are manipulating materials, like with counting not that there not just counting on the SMARTBoard, but that they have real objects.

Participant 9 stated, "I believe that there are many advantages to using technology with early childhood students; especially with the way the world is going." One participant sees the advantages of technology, but she reports that we don't have enough resources.

Participant 4 described her views:

Having more instruments that work and that are hands-on for kids. I have several kids that could benefit from using computers, whether joystick, keyboard or mouse. We don't have enough technology right now for them to do so, like a laptop or a desktop. It would be nice to have more technology and have it work.

**Disadvantages of technology in the EC classroom.** Six of 10 participants described disadvantages of technology in the early childhood classroom. Participant 5 reported:

I feel like it (technology) can hinder my instruction along with other teachers' instruction because you can use it more as your teacher tool than using manipulatives. I feel like it can be distracting to the kids at times especially with the nature of the kids we serve with special needs.

Participant 10 explained the importance of managing the balance between doing lessons via technology and providing hands-on learning activities:

I think you just have to be careful to not make our entire classroom, technology. This is the time that for kids to build the skills they need to talk to each other and learn cooperation. I don't want to sit them in front of technology. I think it (learning) needs to be hands-on.

Participant 7 stated the difficulty she has with finding developmentally appropriate applications:

I think it's hard to find developmentally appropriate applications for children with disabilities. From a special education point of view I think it's more challenging to find applications for a delayed 4 year old, versus a typically developing 4 year old. I don't want it to be 'babyish', but I want it to provide the children with what meets their needs.

Participant 9 explained:

I feel there needs to be a huge balance, because kids still learn, as research has said time and time again, from hands-on experiences and a variety of ways and using technology is just one of those ways. Not the be all – end all, as clearly shown by the students in my classes this year.

### **Research Question 2**

The second research question was: What strategies do early childhood teachers believe would be best to implement change toward using developmentally appropriate computer applications? According to the data collected, four common themes were uncovered through data analysis. The transition to the information age requires educational leaders and stakeholders to use new instructional strategies. However, research contends our current educational system operates on old educational values and systems (Watson, Watson, & Reigeluth, 2008). For children to use developmentally appropriate computer applications that provide students educationally relevant and high quality content systemic change needs to occur.

Through the data analysis of this study, many teachers discussed portions of the six aspects of the systemic change process: “(a) broad stakeholder ownership, (b) development of a learning organization, (c) understanding the systemic change process, (d) evolving mindsets about education, (e) systems view of education, and (f) systems design” (Joseph & Reigeluth, 2010, p. 99). Common threads revealed, a lack of funding, the lack of a learning organization, the need for stakeholder buy-in, and the need for disseminating resources and instructional strategies.

**Funding.** Most participants discussed budget concerns and the lack of funding. Budget concerns were a concern with regard to purchasing hardware, software, applications, and providing training. Funding and grants were also discussed by five of 10 teachers. Participant 1 stated a concern she has is:

Well, I would say first off they need to have a technology fund for the early childhood program. Our funding that we get, we can't use it to buy any kind technology, computers, iPads that all has to go through district office. So it would be nice to have a little budget every year so we could get new programs or buy apps. So I think a budget would be nice.

She went on to offer a suggestion for change:

I would also say to try and do some of those DonorChoose projects where they get the technology. Cause I'll be honest with you, as a preschool program we don't get a lot of technology, extra technology pieces. Like you have what you have, and that's what you have. So unless you go out and find funding other places you just don't have access to that. So, that's why I've turned to the DonorsChoose because you're able to just get so many things (additional technology) for your classroom. So I would say, access some different resources like that. Maybe try to apply for some grants, where they can get some more technology pieces for their classroom.

Most participants agreed there needs to be more professional development opportunities focused on implementing DAP. Participant 5 specially discussed the need for funding training:

I know that the training does cost money and I think that principals would have to factor that in. But I know there is money out there and I know a lot of them can find it. So if we could definitely look at more training.

Two participants discussed using their own money to buy computer applications.

Participant 10 stated:

I do it (buy computer applications), it's all out of my pocket. A lot of them are free. All of the Fisher Price ones are free. Some of them are a little pricier, \$5, \$6, \$7. It kind of depends on what the reviews have said. If it hasn't gotten very good reviews then I'm not gonna get it. We use them straight on the SMARTBoard.

Participant 3 discussed how she uses her own money:

I've had to buy all my own apps. And the problem is the free apps only give you a part of the app, so you want to see it all, so you go back in and buy the whole app. I've spent quite a bit of money.

She went on to say:

It would be great if teachers had access to that (an iPad). And also had access to some money to buy applications or something like that. I know mines personal, but if we had some in our district, then some of those programs could be purchased and put on there.

Participant 4 concurred that more iPads would be an asset for instruction:

Trying to get some iPads maybe through the district for our classrooms. I know I just saw an e-mail from the district yesterday that they are buying more MACS



for the elementary aged students. Utilizing those moneys for early childhood classrooms for 1 or 2 iPads per classroom, having desktops that work, or MacBooks that the kids could use.

And she added, “I would like to utilize it (technology) more, if I had more availability. If there were more things in the room that we could use that would be great.” Participant 5 stated the need for replacing the old technology, replacing some of the outdated technology that we have. “We have different things, but they may not get used because they take so much time. So looking at the monetary value of replacing some things or fixing them.”

**Training.** All of the participants agreed that more training is needed for the purpose of implementing DAP technology into the early childhood classroom. Participants concurred that implementing technology in the classroom is currently done on the spot or through peer support. Participant 3 stated, “I haven’t had any specific training; it’s been all self-taught or I’ve used other teachers. It’s just apps I’ve explored and learned to use on my own.” Participant 4 reported:

It’s been learn as you go with the SMARTBoards. We got a little bit of training when we got the Hatch when the SMARTBoards came. Where to find places on it, pretty basic, how to turn it on, turn it off. As intense training, I haven’t gotten anything through the district.

Participant 1 explained:

This HATCH computer, I was not familiar with HATCH. I had no idea what it really was. No one really trained us on how to do it. We were just told it was in

our self-service and to download it and go from there. And so, I just had to go in and navigate it and learn it myself. No one from the district really trained us, I even asked for that and didn't get it. And so, that's another reason I'm not super familiar with it, cause I'm learning as I go.

Participant 10 stated:

We need more teacher friendly training. And by teacher friendly I mean teachers go in and pick the level where we're at. We've all gone to trainings before where someone says, "wait, how do I turn this on." We need to do it like we do the kids, differentiate the instruction, ok here's how you turn it on, and you guys go in and do this, and then I'll get back to you.

Participant 2 stated, "I don't think we utilize it (technology) enough and I don't think there's enough training for us to be able to use it." Participant 5 reported,

I think that a lot of the activities that we do are limited, because we don't have additional training. Teachers may explore on their own, but it's important to have the different training. I know that the training does costs money and I think that principals would have to factor that in.

Participant 7 reported, "I think there is a lack of training for teachers, it's been all self taught. It's just me being interested and wanted to offer those opportunities to my students." Participant 3 stated:

I would love staff development and training. There is so much technology out there. I mean I'm using a SMARTBoard, an iPad, and a desktop computer. I'm

sure there is a whole world of things we could be using to teach kids. Ya, staff development would be huge.

Upon the interview question, “Tell me about training you have received on implementing computer applications into early childhood classrooms while you were in college.” None of the teachers recalled any training in college for the purpose of implementing computer applications in the early childhood.

**Stakeholder buy-in.** Joseph and Reigeluth (2010) contended that one of the most important aspects of systemic change is facilitating stakeholders to change their mindset about education. There was a wide continuum of answers when asked, “Who are the major stakeholders in your setting?” Only four of 10 participants listed the principals or assistant principals as stakeholders. Two of 10 participants listed administrative staff above the principal as stakeholders in their setting. Participant 9 stated, “I mean I would like to think we all do. I think the professional staff and the parents are the main ones.”

Participant 10 stated:

The major stakeholders are the kids. This is their future. Letting them play and explore. Developing that sense of finishing a task and a sense of accomplishment. They like to teamwork, they like to build stuff together. They are the stakeholders. We are all going to benefit from it. The principals have a stake in it these are the kids that are going to come up. It's really the kids.

Participant 2 reported, “The major stakeholders should be the students. But I don't think that's the thing in our building. There are more issues going on and that technology gets pushed to the side.” Participant 3 explained, “In my opinion, our students and parents

come first. That's really the priority. Other than that, it is just us trying to get the kids where they need to be. And the families where they need to be." Participant 4 stated, "The kids and the adults in the room. The people that work closely with the students. And then their parents." Participant 5 reported, "The stakeholders would be our principal, assistant principal, the director of special education, most of the staff at central office who help run the district, and the superintendent and his office staff." Participant 7 listed, "I think parents, principal, vice principal, but it goes above that, the superintendent, the deputy superintendents and the Special Education Director."

Participant 10 stated:

The major stakeholders are the kids. This is their future. Letting them play and explore. Developing that sense of finishing a task and a sense of accomplishment. They like to team work, they like to build stuff together. They are the stakeholders.

She went on to explain, "We just need to be more open for technology in preschool. I think the administration just needs to see how we could use it." As mentioned by Participant 10: the need for administrator buy-in was overarching theme from all of the teachers. Participant 8 stated, "I think that administrators should come in, see what we're doing, and observe and make sure they know where the kids are at." Participant 7 reported:

I think that they (administrators) say it is important, but at the same time I don't see that there is a lot happening to help us with that. I think our technology could

be updated. I think there could be more of it (technology); I think the teachers go above and beyond to provide it, but not administration.

Participant 5 reported:

I would like to see principals come into the classroom and see how long it takes for me turn on the SMARTBoard, open up a program, wait for it to load, and then be able to implement it with the students. I feel like principals do not see how long it takes for us with the outdated technology. I feel like the principals are using iPads and the principals have the latest and greatest, but when it comes down to the classroom and what the students need to use and how much time it takes to load certain programs, time is missed and so that definitely wastes a lot of time that students could be working on all kinds of skills.

Participant 2 stated, “I think that our current administration does not feel technology is important.” Participant 3 reported, “Well, like I said, maybe administrators could help us come up with ways, either through grants or rebudgeting so we that can access that (developmentally appropriate practices). So we can access appropriate technology. So it’s readily available to teachers and classrooms.”

**Resources.** Most participants responded that there is a need for more resources as a suggestion for systemic change. The resources varied from a list of developmentally appropriate practices, more time, more hardware options to facilitate accessibility, and more technology including a variety of computer applications. Participant 9 mentioned hardware and funding resources are needed:

I don't have an iPad or an iPod at my disposal, I am limited with what I can do with technology, do to the lack of accessibility. I think there is a greater potential for learning through technology, but it is just not available right now. I would have hoped that I would have had more resources. I have written a grant, and turned down, and I would do it again, but I don't think it is seen as a priority in early childhood. I agree with that, I just don't think it should be a primary teaching tool.

Participant 1 stated, "...have them (administrators) do some research on some different apps or different programs or different things that work well." Participant 2 reported,

I think that all of our buildings need to have their own IT person. As much technology that we are getting in, I just think that would be a better utilization of those staff people, is to be hands-on and in the buildings.

Participant 3 stated:

Well, like I said, maybe administrators could help us come up with ways, either through grants or rebudgeting so we that can access that (more hardware). So we can access appropriate technology. So it's readily available to teachers and classrooms.

Participant 6 reported, "I don't know if it's feasible for every child to have their own computer, but maybe some to chose from at centers." Similarly, for each child to have their own computer, participant 8 added, "Just make sure it is accessible for all children regardless of their disability. If they are not able to access it independently that we ensure that each child has an opportunity to use the technology." Participant 10 stated:

We just need to be more open for technology in preschool. I think the administration just needs to see how we could use it. We need the life proof boxes because they do get dropped; some of the high schoolers need the life proof boxes too. I just think that we all need to be open to it. See if that's the direction we need to go.

### **Document Analysis**

The document analysis included numerous emails with the Office of Curriculum and Professional Development, two unanswered e-mails to the Executive Director - Instructional Technology, a search of board meeting agendas and notes, and personal communication. Document analysis was also conducted by researching the school district's BoardDocs, documents shared from the Office of Curriculum and Professional Development, and documents from school leaders. Two themes were discovered. One theme was professional development activities and the other was targeted audience for technology plans and instructional alignment.

**Professional Development.** Three types of professional development are offered by the school district. One type is done at each school, on a school day, during contracted hours and is planned by school leaders. Another type of professional development is called professional growth classes (PGC's). These courses are offered to all school district employees for a fee. These classes vary in content and are taught by peer's within the district's staff members. The other type of professional development is called Summer Academy. In information provided by the Office of Curriculum and Professional Development:

Summer Academy is an opportunity for all certified staff members to extend their learning around topics that will impact instructional practice, thereby student learning. Input from teachers, principals, CTTN, the Professional Development Committee and a variety of representative departments helped to inform the final composition of the week of Summer Academy.

Syllabi from the last three years of Summer Academy were provided to me for the document analysis. A variety of the Summer Academy courses were offered with emphasis on technology. These classes included (but not limited to): iLife training with emphasis on iLife Applications, Apple technology training by an Apple professional, Challenged Based Learning with emphasis on Challenge Based Learning, Effectively Teaching Language with emphasis on special education teachers for the purpose of efficiently and effectively planning for comprehensive intervention, To Integrate or Transform with emphasis on engaging in dialogue on how pedagogy can and must change in a digitally connected environment. Through this analysis, the classes that were focused on technology, provided instruction to teachers who work with all age groups in the district. Most syllabi inferred that teachers would apply their new knowledge to their specific classrooms. The data provided through the document analysis lacked courses that specifically targeted technology integration for the purpose of early childhood or early childhood special education curriculum.

Most participants agreed they would benefit from professional growth classes that focus on embedding developmentally appropriate technology into the early childhood classroom. Another common thread in the data revealed a lack of professional growth



classes that specifically target intervention for early childhood; resulting in even fewer professional growth classes for embedding developmentally appropriate technology. The document analysis confirmed the district provides a wealth of professional growth classes, but lacks courses on improving the implementation of developmentally appropriate computer applications.

**Technology Plans and Alignment.** There are no current technology plans or technology curriculum alignments for early childhood. A Coordinator of Instruction and Technology for the district stated the process for requesting software for K-12 is:

Instructional coordinators review based on current standards for alignment and may have teachers pilot from time to time. Folks in our technology department check for set-up process, browser specs, hardware specs, and look for other logistical pieces to ensure it will work on our network. Once alignment is established that are generally multiple meetings with the vendor to ensure success from a logistical and instructional standpoint. (personal communication, October 15, 2014)

### **Document Analysis Summary**

The recurrent theme from document analysis is how our district lacks process or procedures for acquiring new hardware or software for early childhood. It was noted that if I was inquiring about free software that I was able to try that out on my own. The process listed above would just be if software needs to be purchased. The district lacks a technology plan for early childhood. The Coordinator of Instruction and Technology went on to add via e-mail:

Several years ago we did a software audit in an effort to become consistent with the resources offered to students. Individual buildings can no longer purchase software. The final decisions are made in conjunction with the appropriate directors (elementary, secondary, assessment and technology) and dollars are transferred accordingly.

Again, there was a lack of early childhood in the verbiage or consideration in the process for acquiring software or technology. Two e-mails were directed to the Executive Director - Instructional Technology without a response. However in a review of the Board Meeting summary received via e-mail from the district's communication specialist dated September 20, 2014, the Board of Education approved a measure to pay off the current lease for 6,000 Apple MacBook Airs while also keeping 4,000 student devices for the use of middle and elementary students. The district will also sign a new lease agreement that would continue the 1-to-1 initiatives at the high school level with 6,200 new devices through 2018-2019. This summary continues to disregard any type of device or technology plan for early childhood students.

### **Discrepant Cases**

Two participants discussed how technology hinders instruction in the early childhood classroom. Participant 2 stated;

I think it (technology) hinders, because a lot of kids we have, socialization piece is missing, and so they are already tuned into technology, the population that we have are delayed, so you look at that ~ it hinders on what we think they can do. We are trying to get more socialization in.

Participant 10 stated:

I think you just have to be careful to not make our entire classroom, technology. This is the time that for kids to build the skills they need to talk to each other and learn cooperation. I don't want to sit them in front of technology. I think it (learning) needs to be hands-on.

Upon asking for clarification about how developmental milestones impact her decision-making and lesson planning with regard to technology Participant 10 stated:

They really don't, because I don't use a ton of technology. The technology is there if the kids would like to use it. The backgrounds that our kids come from, a lot of them have technology at home, but they don't play time with their friends. They live in apartments, they live in townhomes, they don't live in neighborhoods with kids. They like to go to the centers and play with their friends. For most of my kids, when their Hatch time comes up, they ask me, "do we have to do it."

This was the only participant that explained that her students do not readily want to use technology. In contrast to other responses, Participant 10 reported:

They (administrators) don't understand what we're going to do with it, so they don't want us to have it. You want us to play in preschool, but in kindergarten you take all of that away, which isn't developmentally appropriate. There isn't a good balance of technology in upper grades and technology in lower grades.

However, the overall tone from both interviews reflected a positive feeling and that participants embrace technology in the classroom. An example of this contradiction was,

Participant 10 stated, “We just need to be more open for technology in preschool. I think the administration just needs to see how we could use it.”

### **Evidence of Quality**

In qualitative research, “case study is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources” (Baxter & Jack, 2008, p. 544). I utilized an expert panel to review the potential interview questions. The expert panel provided a level of social validity. The criteria for social validity involves the level of involvement by the stakeholders whom create the systems that affect both success and independence in a positive manner (Scott, 2007). During the interviews, efforts were made to put my personal opinions and beliefs aside in order to avoid influencing the participants during the interview. Bracketing was utilized to put aside my personal beliefs regarding the implementation of DAP. The practice of bracketing increases the validity of the data collection and data analysis (Tufford & Newman, 2010). Through bracketing I was aware of my own bias and presuppositions regarding developmentally appropriate practices. Field notes were used to record the date, setting, behaviors, activities, events and other features present during the interview. Finally, member checking was completed to ensure my interpretations of the data accurately depicted the participants’ perspectives. Member checking is the process of data being shared with the participants , along with the chance to have a conversation to clarify the researcher’s interpretation and to have the opportunity to contribute new thoughts on the study (Baxter & Jack, 2008).

### **Summary**

The data gleaned from interview participants and document analysis for this case study was presented in this section. Also, a description of the methods used for conducting the study, collecting the data, and data analysis were outlined in this section. The results from the data analysis revealed six overarching themes that were present according to the first research question and four themes for the second research question. Finally, discrepant cases and evidence of quality were explained in this section.

## Section 5: Interpretations, Implications, and Recommendations

### **Overview of the Study**

The purpose of this research was to determine the perspectives of early childhood and early childhood special education teachers on the lack of developmentally appropriate computer applications in early childhood classrooms. The intended outcome of this case study was to provide data for local stakeholders, early childhood teachers, and myself. Evidence through data from this study has provided insight on the teacher perspectives and potential strategies on embedding developmentally appropriate computer applications into early childhood classrooms. The fundamental goal of change process is to develop a system where educators succeed at facilitating student success (Joseph & Reigeluth, 2010).

The theoretical framework used for this study was based upon Joseph and Reigeluth's (2010) systemic change process. These authors contend that educators must understand how educational change is achieved and that change is most effective when constructed in a purposeful and systemic manner. Reigeluth and Joseph (2002) explained, society is changing at a fast rate which is evolving into new educational needs and new educational tools that both require and enable a new, learning focused standard of education that holds promise for exponential growth in meeting the needs of all learners for the information age. The time is now for educators to go beyond basic technology integration and move toward technology transformation (Reigeluth & Joseph, 2002).

A qualitative case study design was selected to investigate teacher perspectives on embedding developmentally appropriate computer applications into the early childhood classroom. Ten teachers consented to be participants in this research study. Three participants were, at the time of this study, early childhood teachers and seven participants were early childhood special education teachers. All teachers participated in individual, semistructured interviews their perspectives on technology in the classroom, their educational background, their views on developmentally appropriate practices, and their suggestions and strategies for change. All interviews were transcribed and member checked, then analyzed, and coded according to patterns within and between categories that were discovered during the data analysis. Document analysis was also conducted by researching the school district's BoardDocs, documents shared from the Office of Curriculum and Professional Development, and documents from school leaders.

### **Research Questions**

The research questions of the study were designed to understand the early childhood teachers' perspectives of embedding developmentally appropriate computer applications. The research questions were:

1. What are teacher perspectives about the use of developmentally appropriate practices while embedding technology into early childhood classrooms?
2. What strategies do early childhood teachers believe would be best to implement change toward using developmentally appropriate computer applications?

Through this qualitative study, six themes were uncovered through Research Question 1, and 4 common themes were revealed through Research Question 2. These themes were: integration of technology into the early childhood classroom, knowledge of developmentally appropriate practices, technology in the early childhood classroom, training and staff development, lack of funding and resources, and advantages and disadvantages of technology in the early childhood classroom.

### **Interpretation of Research Question 1**

The first finding revealed that all participants use technology in their classrooms. The majority of the participants use technology as an integral part of their instruction; examples were circle time and group times without regard to developmentally appropriate practices. The SMARTBoard (interactive whiteboard) was used by all participants.

This is consistent with current research. Wartella, Blackwell, Lauricella, and Robb (2013) reported in a Fall 2012 survey that 21% of their respondents had access to interactive whiteboards, 84% had access to desktop or laptop computers, and 92% had digital cameras. Wang, Kinzie, McGuire, and Pan (2010) reported that educators facilitate student success in the classroom on a daily basis when they used technology-enhanced instruction that complements instruction. However, in this study only one participant stated that she was unable to use her SMARTBoard on a regular basis secondary to the severity of the disabilities presented in her classroom.



### **Developmentally Appropriate Practices**

In conjunction with meaningful and purposeful integration of technology, participants should consider the importance of developmentally appropriate practices. However, the data did not support that participants are using technology in meaningful and purposeful ways. Also, the participants had broad definitions for developmentally appropriate practices. Participants discussed DAP when specifically asked about their definition of DAP and if they considered DAP when selecting software or computer applications.

Rosen and Jaruszewic (2009) explained that diverse learners with unique challenges benefit from developmentally appropriate technology, which embraces children's interest to construct knowledge. Other researchers contended that, before technology can be determined developmentally appropriate, it must be responsive to the developmental needs of the children, interests, and their unique and diverse needs (McKenzie, 2013; McManis & Gunnewig, 2012; Ntuli & Kyei-Blankson, 2011; Wartella et al., 2013). Overall, participants did not demonstrate a strong urgency to determine DAP in their classrooms. Although, some teachers have children who are developmentally functioning at ages of 12 months through 5 years old, the same technology and applications are used for all children.

The reason participants do not demonstrate a strong urgency to implement DAPs may be due to a lack of training. Participants discussed the lack of training specifically for the purpose of embedding developmentally appropriate technologies; hardware and software. This connects to the research of Parette, Quesenberry, and Blum (2010) when

they contended that educational professionals may not understand the value of technology as a DAP and that professional development and preservice trainings require a great deal of improvement. Many participants explained that they received training on the basic functions of the SMARTBoard, but little to no instruction was provided for implementing DAP. Participant 5 stated:

The computer training I received in college was learning how to use Excel, Publisher, and Powerpoint. We learned the Microsoft Office package. That was instruction. In one of my education classes we had a SMARTBoard and we used clickers, but I had not instruction on that or how they loaded it, or how they used it.

Researchers believe that training is essential and that affordable, user-friendly hands-on technology training, professional development opportunities, ongoing support, and access to up-to-date technology soft and hard-ware are vital for educators (Allsopp, McHatton, & Cranston-Gingras, 2009; Chen & Chang, 2006a; NAEYC, 2012). Most of the participants agreed that more training is needed and expressed concern about the lack of training that has been received on embedding the technology into the early childhood classrooms.

### **Lack of Resources**

Participants discussed need for acquiring hardware, software, computer applications, training, and maintenance. The overarching theme attributing to the lack of these resources is funding. The lack of funding and specified resources was consistently mentioned in the data. Most participants stated that they would like to see more

technology in their classrooms. They relayed that having a variety of hardware and software choices would benefit instruction. Research affirms that extrinsic factors, such as funding, adversely impact the use of technology were training, professional development, access to sufficient hardware, software and support (Blackwell et al., 2013; Ertmer et al., 2012; Keengwe & Onchwari, 2009). Participants also stated concerns with the lack of maintenance for the technology in their classrooms. Participant 2 stated, “We don’t have immediate access to somebody to come out and help you. You can call the help desk, but if it’s not something they can help you with over the phone, then you have to file a work order.” Two participants elaborated that if they need technology support that they just figure it out on their own. They also mentioned asking peers for their help and time to fix technology support. The lack of resources such as additional hardware, additional software, maintenance, technology support, and training all result from a lack of funding resources.

### **Embedding Technology**

Overall, participants found embedding technology into their classrooms as advantageous for their students. A common theme from participants is how and what technology they use in their classrooms. All participants reported using technology on a daily basis. Nine of ten teachers reported advantages to having technology in the classroom. In a position statement from the Fred Rogers Center for Early Learning and Children’s Media, when technology is used appropriately and wisely it can advance student learning and develop relationships (NAEYC, 2012).

Further research supports many advantages to developmentally appropriate technology in the classroom such as; increasing literacy skills, motivators, tool for learning and instruction, an avenue for differentiated instruction, and a compliment to enrich current curriculum (Bose, 2009; Etmer et al., 2012; Keengwe & Onchwari, 2009; Keengwe, Onchwari, G., & Onchwari, J., 2009). Nine of 10 participants did all mention how they used the SMARTBoard in circle time and group times. A few participants also allowed their students to play independently on the SMARTBoard. Two participants talked about their students utilizing an iPad, but mainly as a reinforcer or for a free time activity. One participant used Tag Readers to facilitate independent reading activities. According to the data, there was a limited amount of hardware choices provided to early childhood students, however; with the technology they do have many participants listed advantages of having technology in their classrooms.

Although there were many advantages discovered through the data, participants also listed disadvantages to technology in their classroom. Participant 5 stated:

I feel like it (technology) can hinder my instruction along with other teachers' instruction because you can use it more as your teacher tool than using manipulatives. I feel like it can be distracting to the kids at times especially with the nature of the kids we serve with special needs.

Mohammad and Mohammad (2012) stated, "When young children use computers, they are rarely using their large/gross muscle movements" (p. 103). The data from this study revealed 2 participants voiced concerns about hand-eye coordination that is needed for access desktop computer programs. There is a valid concern that using computers in early

childhood does not allow for the same physical development and practice (Mohammad & Mohammad, 2012).

Another participant discussed her concern that by utilizing the SMARTBoard for circle time and group times was developmentally too hard for her students. She stated that the ‘sit and get’ process of using the SMARTBoard was too challenging and did not afford her students with enough hands on learning opportunities. It is imperative that teachers provide intellectually powerful, learner-centered instruction. The passive use of technology is an inappropriate supplement for active play and socialization (NAYEC, 2012).

### **Interpretation of Research Question 2**

Participants shared their suggestions and strategies for implementing change toward implementing developmentally appropriate computer applications in the early childhood classroom. Through the data analysis of this study, many participants discussed portions of the six aspects of the systemic change process: “(a) broad stakeholder ownership, (b) development of a learning organization, (c) understanding the systemic change process, (d) evolving mindsets about education, (e) systems view of education, and (f) systems design” (Joseph & Reigeluth, 2010, p. 99). Common threads revealed, a lack of funding, the lack of a learning organization, the need for stakeholder buy-in, and the lack of resources and instructional strategies as barriers for embedding DAP with regard to technology into the early childhood classroom.

**Funding.** It is evident that all participants felt that they needed more funding. Many researchers also feel an increase in funding and resources would lead to increased

fidelity of implementation of DAP (Mohammad & Mohammad, 2012; Ntuli & Kyei-Blankson, 2011; Wood et al., 2012). The final outcome of a systemic change process is to create systems in which all teachers succeed at facilitating student success (Joseph & Reigeluth, 2010).

For systemic change to occur, an increase in funding for the purpose of increase hardware choices, software, staff development, and technology maintenance would need to occur. Joseph and Reigeluth (2010) also discussed the need for a change in mindset to occur. Mindsets or mental models are one of the most important entities to consider in systemic change. Through data collected via document analysis, the last time there was a substantial amount of funding allocated for the purchase of technology was in July, 2009. A successful systemic change process requires collaboration (Watson, Watson, & Reigeluth, 2008). Through collaboration and discussion with teachers and administrators, a variety of new resources and items may need to be purchased to facilitate change toward using DAP technology in the early childhood classroom.

**Training.** Chen and Reigeluth (2010) found, fundamental change in schools is increasingly noted as important for meeting the diverse educational and social needs of students in a digital, information based world. The data in this study echoed the researchers' findings that there is a need for increasing the tools for all learners in this day and age of technology. Participants reported a common lack of training and the desire for more professional development opportunities. Participant 7 stated, "I think there is a lack of training for teachers, its been all self taught. It's just me being interested and wanted to offer those opportunities to my students." Several participants

reported this same theme. Although most teachers received basic training on how to operate the SMARTBoard there has been little training on implementing instruction. Researchers have found that providing only training is ineffective and that long-term supports are needed to obtain new knowledge and skills by teachers (Ertmer & Ottenbreit-Leftwich, 2010; Chen & Chang, 2006a; Sheridan, Pope Edwards, Marvin, & Knoche, 2009).

Several of the participants repeatedly recognized the need for more training on operating their current technology with higher fidelity. However, none of the participants mentioned more training needed in the area of developmental milestones or data collection for the purpose of assessing developmental readiness. Keengwe and Onchwari (2009) stated teachers should create classrooms based on technology and DAP for children through a variety of learning activities and lessons. Many researchers have found that not only developing the knowledge of how to operate the technology and provide basic instructional knowledge, teachers should have a solid foundational knowledge of developmental appropriate practices (McManis & Gunnewig, 2012; Rosen & Jaruszewicz, 2009).

For systemic change to occur, Joseph and Reigeluth (2010) found the development of a learning organization is one of the key elements for educational change. The learning organization is the ideal version of an organization (e.g., the classroom). These authors continued that the organization (the school) is the facet of their framework that melts all of the elements together. The learning organization in this study, early childhood professionals, currently is not participating in professional development

opportunities for the purpose of embedding developmentally appropriate technology opportunities. In addition to a learning organization, the systems view helps individuals realize the true nature a complex evolving and dynamic system (Joseph & Reigeluth, 2010).

An interesting aspect was discovered when discussing the need for more technology in early childhood classrooms. A few participants conveyed their concern about technology in the classroom. They feel that there can be too much technology. Participant 10 stated:

I think you just have to be careful to not make our entire classroom, technology.

This is the time that for kids to build the skills they need to talk to each other and learn cooperation. I don't want to sit them in front of technology. I think it (learning) needs to be hands-on.

Researchers agree there is a need for more research on infusing technology into the classroom that includes creating opportunities for increased fidelity of pedagogical practice (McManis & Gunnewig, 2012; Rosen & Jaruszewicz, 2009). One critical needs is providing early childhood teachers with ways to acquire knowledge and skills to effectively select and use technology in their classrooms that are appropriate for young children (NAEYC, 2012). By selecting and using technology in appropriate ways, participants may not feel there is too much technology.

**Stakeholder buy-in.** “Educational stakeholders need to develop a systemic view of educational systems and an understanding of the activity of systems in order to



undertake serious systemic change efforts in education” (Joseph & Reigeluth, 2010, p. 108). The dynamics of the educational system should be viewed as a dynamic structure. Most participants acknowledged the needed for greater stakeholder buy-in. Although, there was a large continuum of whom the major stakeholders were in their setting. There was a wide continuum of answers when asked, “Who are the major stakeholders in your setting?” Only 4 of ten participants listed the principals and three listed the assistant principals as stakeholders. There were thirteen different types of stakeholders listed throughout the interviews: the classroom teachers, parents, staff, the community, principal, assistant principal, Central Office Staff, students, professional staff, the district, professional staff, the Superintendent, and the Director of Special Education. During multiple interviews the question, “Who are the major stakeholders in your setting?” was asked to be repeated at least one extra time. This was interpreted in two ways by the researcher, that the participants had not given much thought into who the stakeholders were in their setting and sometimes that the teacher was unfamiliar with that term. This interpretation was determined because some of the participants asked for this question to be restated, some of the participants leaned toward me and used question inflection and repeated, “stakeholders”, some participants listed just the kids, and also because of the wide continuum of responses. Joseph and Reigeluth (2010) explained, education stakeholders included the individuals in the community that have an interest in the education of students in their community.

**Resources.** This systemic change process provides educators with the foundation to achieve greater and sustainable changes. The purpose of this change is to improve our

current educational system (Jenlink, Reigeluth, Carr, & Nelson, 1996). It was evident through the data analysis that participants would benefit from a greater variety of resources. Participants mentioned the need for an increase in the variety of technologies offered to them as instructional tools, greater knowledge of what computer applications are appropriate and available. Other resources that were discussed were attainable maintenance support and greater breadth of wisdom for what technology can offer as an instructional tool. Researchers have also found the lack of resources such as training, access to sufficient hardware, software, and support are barriers for technology integration (Blackwell et al., 2013; Bose, 2009; Bruder, 2010; Wang et al., 2010).

Additionally, a few participants stated that it would be beneficial to know what computer applications were appropriate for their students. Participant 3 responded, “What apps are out there? What applications are out there for data collection? Different programs that have worked for other districts, and how it’s affecting kids and their learning, and their growth.” Most participants stated, to find applications they search on the Internet for ideas to match their students’ interests, their IEP (individualized education plan) goals, or to facilitate a thematic unit being addressed in the class. Only a few participants mentioned searching on the Internet based on developmentally appropriate parameters. The process of systems design takes the stakeholders on a path of purposeful implementation of computer access in the classroom (Joseph & Reigeluth, 2010).

### **Implications for Social Change**

Integrating technology into the early childhood setting is a complex aspect of today's pedagogy. The symbiosis of high fidelity instruction and infusing developmentally appropriate technology continues to elude most early childhood teachers. Early childhood professionals need to initiate change that places effort toward implementing developmentally appropriate technology into the early childhood classroom in purposeful manners. Technology should be utilized as a teaching tool that is essential to successful outcomes instead of as a supplemental teaching tool (Ertmer & Ottenbreity-Leftwich, 2010). The benefit of using developmentally appropriate software in connection with curriculum offers children another medium to practice and rehearse skills. Technology, when used effectively, is an effective tool (Ertmer & Ottenbreity-Lefwich, 2010).

### **Implications for Social Change - Student Learning**

Data revealed through this study found early childhood teachers are using the technology that they are provided, but primarily for group instruction and for circle time activities. Social change toward implementing technology based on a more systematic process of effective evaluation, identification, and use of developmentally appropriate technology is warranted. The NAEYC (2012) concluded, educators should consider using professional judgment in using technology, similar to other instructional decisions they make about other educational tools, and must emphasize active engagement. The data in this study revealed many participants described primarily using their SMARTBoards for calendar and circle time. Upon reflecting on current research and this study, one benefit

of utilizing DAP is for increased student learning opportunities. A potential outcome of this social change would be for teachers to achieve a balance in their intervention strategies. Developmentally appropriate technology use is having an understanding that learners are not passive learners and that their learning is the outcome of teachers placing emphasis on technology that can be used to further student learning (Rosen & Jaruszewicz, 2009). The results of this study focused on the willingness of early childhood teachers to use technology. Providing focus on social change toward implementing DAP with regard to technology will increase the fidelity of instruction and may increase student learning.

### **Implications for Social Change – School Environment**

Stakeholder buy-in and collaborative efforts must be viewed as relevant and as a district priority. Through the findings in the document analysis and the interview data, the early childhood program does not benefit from the same resources as of hardware, software, or the variety of trainings as the rest of the district. Administrators and teachers need to work together to create change in a collaborative manner. A shared vision is another integral notion in systemic change (Watson, Watson, & Reigeluth, 2008). Along with a shared vision, documented educational plans that include technology may aid in change toward using developmentally appropriate technology in the classroom. Simon, Nemeth, and McManis (2013) concluded, many administrators are finding success with developing educational goals that are supplemented with, software, hardware, and professional development that will facilitate reaching the aforementioned goals.

Stakeholders, including early childhood teachers, benefit from information to make appropriate decisions about how to support student learning through interactive media and technology (NAEYC, 2012). There will be a benefit to early childhood teachers and students if stakeholders acknowledge the advantages of which media tools are suitable, appropriate times to integrate technology, how to utilize technology to enhance communication with families, and avenues for integrating digital and media literacy for supporting student success (NAEYC, 2012; Simon, Nemeth, & McManis, 2013).

### **Implications for Social Change - Teachers**

The findings from this study highlight early childhood teachers' perspectives on developmentally appropriate use of computer applications. This study increased the knowledge base on technology use and contributes to the increased understanding of developmentally appropriate practices, which may lead to increased fidelity of instruction. Overall, the implications for social change are harbored in early childhood teachers' ability to be self-aware of what, how, and why they are using technology in their classroom. The development of a learning organization is one of the key elements for educational change (Joseph & Reigeluth, 2010). One implication for social change is for the local district to create a learning organization, which is a major facet of the framework that holds all change together. This will benefit early childhood teachers and provide continuity in the information flow and ongoing elements of educational change through embedding developmentally appropriate computer applications.

### **Recommendations for Action**

The purpose of this qualitative study was to determine the perspectives of early childhood and early childhood special education teachers on developmentally appropriate computer applications. Intended outcome of this case study was to establish data for the researcher, the local stakeholders, and early childhood teachers with knowledge and potentially strategies on embedding developmentally appropriate computer applications into their classrooms. My basis for recommendations for action was gained from data revealed in this study. Areas requiring further action were, funding sources, importance of a learning organization, the need for stakeholder buy-in, and additional instructional strategies for embedding DAP with regard to technology into the early childhood classroom.

#### **Recommended Action – Increased Resources**

Researchers agreed that an increase in funding and resources would lead to increased fidelity of implementation of DAP (Mohammad & Mohammad, 2012; Ntuli & Kyei-Blankson, 2011; Wood et al., 2012). The document analysis revealed that it has been four years since the early childhood program has allocated a substantial amount of money on technology. A recommended action is for administrators to place more emphasis on the funding for new software, hardware, funding for maintenance, and professional development activities for early childhood. If technology is to be used as an instructional tool, administrators should put more emphasis on funding for technology resources in the early childhood classrooms and pedagogy and the curriculum should be

the driving force for using technology as instructional tools (Ntuli & Kyei-Blankson, 2010).

### **Recommended Action – Stakeholder Buy-In**

Administrators, the school community, staff members, and children comprise the stakeholders in this study. Stakeholders should embrace technology as a valuable teaching tool. While acknowledging that utilizing technology within the early childhood system is in need of improvement, stakeholders should consider honoring the early childhood foundation (Bruder, 2010). A recommendation is for educational leaders to provide equitable access for early childhood students to technology and interactive media experiences (NAEYC, 2012). Also, educational leaders should demonstrate leadership and vision for implementing successful integration of technology that improves the current system (Bruder, 2010; Keengwe & Onchwari, 2009).

### **Recommended Action – Develop Learning Organization**

Another recommendation for action is the development of a learning organization. Based on the data yielded from the research, the learning organization would discuss opportunities for DAP, professional development ideas, and the potential for differentiated instruction strategies within the early childhood classroom. For systemic change to occur, Joseph & Reigeluth (2010), found the development of a learning organization is one of the key elements for educational change. Teachers need to have appropriate technology knowledge and skills first before they can effectively use computers in the classroom (Chen & Chang, 2006a; Keengwe & Onchwari, 2009; NAEYC, 2012). McManis and Gunnewig (2012) recommended developing a learning

organization comprised of teachers who gather regularly in small groups to discuss personal goals, methods for attaining them, and collectively to develop instructional plans for implementing developmentally appropriate technology offers opportunities for successful implementation of technology. The learning organization may also provide online resources, including technology as part of formal planning (lesson plans, experience sheets), and help teachers connect learning objectives with technology tools (Simon, Nemeth, & McManis, 2013). Finally, a learning community that dedicates time for collaboration and time for training educators on how to embed developmentally appropriate technology is an essential component (McManis & Gunnewig, 2012).

#### **Recommended Action – Instructional Coaches and Guidelines**

Additional resources are needed for successfully embedding developmentally appropriate computer applications into the early childhood classroom. McManis and Gunnewig (2012) listed key ways for evaluating technology: “(a) establish learning goals for the children, (b) identify the hardware or device(s) you have or would like to have, (c) analyze features and content of the software/ program in meeting learning goals, and (d) plan how the educational technology will be integrated into the curriculum” (p. 17). These key ways for evaluating technology should be utilized as guides for selecting applications by educators. The use of these entities for evaluating technology may also empower educators on how and when to use the technology.

A recommendation is for a list of developmentally appropriate software and web sites to be created and disseminated to all early childhood staff. An important consideration for developing a list of developmentally appropriate software is that it



should be based on the developmental levels, needs and interests individual children and to their cultural and social environments (McManis & Gunnewig, 2012). Many participants in this study acknowledge a lack of resources for determining or selecting developmentally appropriate software and technology.

Simon, Nemeth and McManis (2013) suggested, one way to move toward increasing technology integration into the early childhood classroom is to move toward a systematic and consistent manner for documenting how technology activities are being implemented to enhance learning objectives. Data from this study agreed that there is a lack of documenting technology use, student achievements, or documentation of the connection between learning objectives and technology use. A recommendation from this study is to implement instructional coaches which could offer teachers support and strategies for documenting how technology activities are connecting with learning objectives.

### **Recommendations for Further Study**

Future research is needed on developmentally appropriate computer applications. More data needs to be given to educators on what domains and developmental levels are presented in the software. Further research is needed on the accountability; not only for the child's outcomes, but across all components of the delivery of educational services (Bruder, 2010).

Further research is needed upon implementation of recommendations from this study. A possible study in the future that investigates how teachers are implementing developmentally appropriate practices via technology. The district provides several

professional development opportunities, however; more research is needed on how to instruct teachers on implementing DAP with technology.

Additional information on the perspectives of administrators and the use of DAP technology is needed. A common theme throughout this study was the lack of funding. After recommendations of this study are implemented, it may be interesting to do an investigation of administrator perceptions on the progress toward early childhood teachers implementing developmentally appropriate commuter applications.

### **Reflection**

In the initial stages of this study I wondered just how much I would learn. I did feel confident in my exposure to most early childhood classrooms in the district. However, I was pleasantly surprised at just how excited about technology some of the participants were. During the interviews it was really a pleasure to get the opportunity to listen to these participants and learn how they embrace their roles as educators. All of my interviews were positive and it was an honored to get to know the participants on a new level.

Overall, my journey through this research study has been rewarding and enlightening. I have been in the field of special education for 15 years. During my short tenure I have already seen many changes. Technology is one of the areas that I have seen the most growth. I feel that technology can offer our students with a wide continuum of experiences and can accentuate instruction in ways we do not fully understand today. I believe in the conceptual framework presented in this study. I do think that with systemic change and with greater stakeholder buy-in that true change can occur.

## **Conclusion**

The power of technology is to support learning. Early childhood teachers need to embrace the infusion of technology into the classroom that includes creating opportunities for increased fidelity of pedagogical practice. LeMahieu (2011) clarified that teachers should be less concerned with doing exactly what they say to do and more doing what matters most and works best while accommodating local needs and circumstances. The finite balance between embedding DAP technology and providing haphazard technology exposure continues to elude early childhood teachers. However, with this study's findings there is a greater understanding of early childhood teachers' perspectives of developmentally appropriate use of computer applications. Also, this study provides a foundation for implications and recommendations for change toward increasing developmentally appropriate practices with regard to computer applications.

## References

- Allsopp, D. H., McHatton, P. A., & Cranston-Gingras, A. (2009). Examining perceptions of systematic integration of instructional technology in a teacher education program. *Teacher Education and Special Education, 32*(4), 337-350. doi: 10.1177/0888406409346144
- American Academy of Pediatrics. (2011). *Babies and toddlers should learn from play, not screens*. Elk Grove, IL: Author. Retrieved from <http://www.aap.org/pressroom/mediaunder2.pdf>
- Aslan, S., & Reigeluth, C.M. (2013). Educational technologists: Leading change for a new paradigm of education. *TechTrends, 57*(5). doi: 10.1007/s11528-013-0687-4
- Bapir, M. A. (n.d.). Validity and reliability in qualitative research. Retrieved from [http://www.academia.edu/997438/Validity\\_and\\_Reliability\\_in\\_Qualitative\\_Research](http://www.academia.edu/997438/Validity_and_Reliability_in_Qualitative_Research)
- Baxter, P. & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report, 13*(4), 544-559.
- Bergen, D., & Davis, D. (2011). Influences of technology-related playful activity and thought on moral development. *American Journal of Play, 4*(1), 80-99.
- Blackwell, C. K., Lauricella, A. R., Wartella, E., Robb, M., & Schomburg, R. (2013). Adoption and use of technology in early education: The interplay of extrinsic barriers and teacher attitudes. *Computers & Education, 69*, 310-319.
- Blake, B., & Pope, T. (2008). Developmental psychology: Incorporating Piaget's and Vygotsky's theories in classrooms. *Journal of Cross-Disciplinary Perspectives in*

- Education*, 1(1), 59-67. Retrieved from  
<http://jcpe.wmwikis.net/file/view/blakepope.pdf/330666844/blakepope.pdf>
- Bogdan, R. C., & Biklen, S. K. (2007). *Qualitative research for education: An introduction to theories and methods* (5th ed.). Boston, MA: Allyn & Bacon.
- Bose, K., (2009). Developmentally appropriate technology in early childhood (DATEC) in Botswana: In-service teachers' perspectives. *International Electronic Journal of Elementary Education*, 1(3), 218-231.
- Bowen, G.A. (2009) Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40.
- Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Exceptional Children*, 71(2), 195–207.
- Brown, C. P., & Lee, J. (2012). How to teach to the child when the stakes are high: Examples of implementing developmentally appropriate and culturally relevant practices in prekindergarten. *Journal of Early Childhood Teacher Education*, 33(4), 322-348. doi: 10.1080/10901027.2012.732665
- Bruder, M. B. (2010). Early childhood intervention: A promise to children and families for their future. *Exceptional Children*, 76(3), 339-355.
- Burnett, C. (2010). Technology and literacy in early childhood educational settings: A review of research. *Journal of Early Childhood Literacy*, 10(3), 247-270. doi: 10.1177/1468798410372154
- Century, J., Rudnick, M., & Freeman, C. (2010). A framework for measuring fidelity of implementation: A foundation for shared language and accumulation of

- knowledge. *American Journal of Evaluation*, 31(2), 199–218. doi: 10.1177/1098214010366173
- Cerniglia, E. G. (2012). Implementing research-based curricula in pre-k through 3rd grade classrooms. *YC: Young Children*, 67(5), 72-75.
- Chen, J.Q., & Chang, C. (2006a). A comprehensive approach to technology training for early childhood teachers. *Early Education & Development*, 17(3), 443-465.
- Chen, J.Q., & Chang, C. (2006b). Using computers in early childhood classrooms: Teachers' attitudes, skills, and practices. *Journal of Early Childhood Research*, 4, 169-188. doi: 10.1177/1476718X06063535
- Chen, Z., & Reigeluth, C. M. (2010). Communication in a Leadership Team for Systemic Change in a School District. *Contemporary Educational Technology*, 1(3).
- Chuang, H. H., & Ho, C. J. (2011). An investigation of early childhood teachers' technological pedagogical content knowledge (TPACK) in Taiwan. *Journal of Kirsehir Education Faculty*, 12(2), 99-117.
- Conati, C., & Manske, M. (2009, July). Adaptive feedback in an educational game for number factorization. *AIED* (pp. 581-583). Retrieved from [http://celstec.org/system/files/file/conference\\_proceedings/aeid2009/papers/paper\\_29.pdf](http://celstec.org/system/files/file/conference_proceedings/aeid2009/papers/paper_29.pdf)
- Copple, C., & Bredekamp, S. (2009). *Developmentally appropriate practice in early childhood programs serving children from birth through age 8*. Retrieved from [http://www.naeyc.org/store/files/store/TOC/375\\_0.pdf](http://www.naeyc.org/store/files/store/TOC/375_0.pdf)

- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (Laureate custom ed.). Boston, MA: Pearson Education, Inc.
- Crouse, L.J., & Chen, D. W. (2010). A tablet computer for young children? Exploring its viability for early childhood education. *Journal of Research on Technology in Education, 43*(1), 75-98.
- Cviko, A., McKenney, S., & Voogt, J. (2012). Teachers enacting a technology-rich curriculum for emergent literacy. *Educational technology research and development, 60*(1), 31-54. doi: 10.1007/s11423-011-9208-3
- Dietze, B., & Kashin, D. (2013). Shifting Views: Exploring the Potential for Technology Integration in Early Childhood Education Programs. *Canadian Journal Of Learning & Technology, 39*(4), 1-12.
- Ellis, T. J., & Levy, Y. (2009). Towards a Guide for Novice Researchers on Research Methodology: Review and Proposed Methods. *Issues in Informing Science & Information Technology, 6*.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education, 42*(3), 255-284.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. *Computers & Education, 59*(2), 423-435.

- Gray, L., Thomas, N., & Lewis, L. (2010). Teachers' use of educational technology in US public schools: 2009. First look. NCES 2010-040. *National Center for Education Statistics*. Retrieved from <http://files.eric.ed.gov/fulltext/ED509514.pdf>
- Goddard, Y., Goddard, R., & Tschannen-Moran, M. (2007). A theoretical and empirical investigation of teacher collaboration for school improvement and student achievement in public elementary schools. *The Teachers College Record*, 109(4), 877-896.
- Heo, J., Han, S., Koch, C., & Aydin, H. (2011). Piaget's egocentrism and language learning: Language egocentrism (LE) and language differentiation (LD). *Journal Of Language Teaching & Research*, 2(4), 733-739. doi: 10.4304/jltr.2.4.733-739
- Hoepfl, M. C. (1997). Choosing qualitative research: A primer for technology education researchers. *Journal of Technology Education*, 9(1). Retrieved from <http://scholar.lib.vt.edu/ejournals/JTE/v9n1/hoepfl.html>
- Hutchinson, A., Beschorner, B., & Schmidt-Crawford, D. (2012). Exploring the use of the iPad in literacy learning. *The Reading Teacher*, 66 (1), 15-23. doi: 10.1002/TRTR.01090
- Jenlink, P. M., Reigeluth, C. M., Carr, A. A., & Nelson, L. M. (1996). An expedition for change: Facilitating the systemic change process in school districts. *TechTrends*, 41(1), 21-30.
- Joseph, R., & Reigeluth, C. M. (2005). Formative research on an early stage of systemic change process in a small district. *British Journal of Educational Technology*. 36(6), 937-956.



- Joseph, R., & Reigeluth, C. M. (2010). The systemic change process in education: A conceptual framework. *Contemporary Educational Technology, 1*(2), 97-117.
- Keengwe, J., & Onchwari, G. (2009). Technology and early childhood education: A technology integration professional development model for practicing teachers. *Early Childhood Education Journal, 37*(3), 209-218.
- Keengwe, J., Onchwari, G., & Onchwari, J. (2009). Technology and student learning: Toward a learner-centered teaching model, *AACE Journal, 17*(1), 11-22.
- Kugelmass, J. W. (2007). *Constructivist views of learning: implications for inclusive education*. The SAGE handbook of special education, 272-279.
- La Paro, K. M., Thomason, A. C., Lower, J. K., Kintner-Duffy, V. L., & Cassidy, D. J. (2012). Examining the definition and measurement of quality in early childhood education: A review of studies using the ECERS-R from 2003 to 2010. *Early Childhood Research & Practice, 14*(1), 1.
- Learning Theories. (2014). Learning theories: Knowledgebase and webliography. Retrieved from [www.learning-theories.com](http://www.learning-theories.com)
- Lee, Y. (2009). Pre-K children's interaction with educational software programs: An observation of capabilities and levels of engagement. *Journal of Educational Multimedia and Hypermedia, 18*(3), 289-309.
- Lodico, M., Spaulding, D., & Voegtler, K. (2010). *Methods in educational research: From theory to practice* (Laureate Education, Inc., custom ed.). San Francisco, CA: John Wiley & Sons.

- Long, N. (2012). *Is Qualitative a Viable Means of Educational Research? Dealing With Substance and Rigor in Qualitative Research*, Walden University, Minneapolis, MN.
- Mahmood, S. (2013). "Reality Shock": New early childhood education teachers. *Journal of Early Childhood Teacher Education*, 34(2), 154-170. doi: 10.1080/10901027.2013.787477
- Merriam, S. B. (2002). *Qualitative research in practice: Examples for discussion and analysis*. San Francisco, CA: Jossey-Bass Inc Pub.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass Inc Pub.
- McKenzie, E. (2013). National board certification and developmentally appropriate practices: Perceptions of impact. *Journal of Research in Childhood Education*, 27(2), 153-165. doi: 10.1080/02568543.2013.766661
- McManis, L. D., & Gunnewig, S. B. (2012). Finding the education in educational technology with early learners. *Young Children*, 67(3), 14-25.
- Mohammad, M., & Mohammad, H. (2012). Computer integration into the early childhood curriculum. *Education*, 133(1), 97-116.
- More, C. M., & Travers, J. C. (2013). What's app with that? Selecting educational apps for young children with disabilities. *Young Exceptional Children*, 16(2), 15-32. doi: 10.1177/1096250612464763
- National Association for the Education of Young Children (2009). *Developmentally appropriate practice in early childhood programs service children from birth*

*through age 8. Position statement.* Retrieved from

<http://www.naeyc.org/files/naeyc/file/positions/position%20statement%20Web.pdf>

National Association for the Education of Young Children (2012). *Technology and*

*interactive media as tools in early childhood programs serving children from*

*birth through age 8.* Retrieved from <http://www.naeyc.org/content/technology-and-young-children>

National Association for the Education of Young Children (n.d.). *Developmentally*

*appropriate practice (DAP).* Retrieved from <http://www.naeyc.org/DAP>

National Institutes of Health Office of Extramural Research (2011). *Protecting Human*

*Subjects Research.* Retrieved from <http://phrp.nihtraining.com>

Noor, K.B.M. (2008). Case study: A strategic research methodology. *American Journal of Applied Sciences*, 5(11).

Ntuli, E., & Kyei-Blankson, L. (2010). Teachers' understanding and use of

developmentally appropriate computer technology. *Journal of Technology Integration in the Classroom*, 2, 23-35.

Ntuli, E., & Kyei-Blankson, L. (2011). Teacher criteria for evaluating and selecting

developmentally appropriate computer software. *Journal of Educational Multimedia and Hypermedia*, 20(2), 179-193.

Parette, H. P., Quesenberry, A. C., & Blum, C. (2010). Missing the boat with technology usage in early childhood settings: A 21st century view of developmentally

- appropriate practice. *Early Childhood Education Journal*, 37(5), 335-343. doi: 10.1007/s10643-009-0352-x
- Piaget, J. (1964). Part I: Cognitive development in children: Piaget development and learning. *Journal of research in science teaching*, 2(3), 176-186.
- Plowman, L., & Stephen, C. (2005). Children, play, and computers in pre-school education. *British Journal of Educational Technology*, 36(2), 145-157.
- Reigeluth, C. M., & Garfinkle, R. J. (Eds.). (1994). *Systemic change in education*. Englewood Cliffs, NJ: Educational Technology Publications Inc.
- Reigeluth, C. M., & Joseph, R. (2002). Beyond technology integration: The case. *Educational Technology*. July-August 9-13
- Rosen, D. B., & Jaruszewicz, C. (2009). Developmentally appropriate technology use and early childhood teacher education. *Journal of Early Childhood Teacher Education*, 30(2), 162-171. doi: 10.1080/10901020902886511
- Rumrill, P. D., Cook, B. G., & Wiley, A. L. (2011). *Research in special education: Designs, methods, and applications*. Springfield, IL: Charles C. Thomas Publisher, LTD.
- Schwandt, T. A., Lincoln, Y. S., & Guba, E. G. (2007). Judging interpretations: but is it rigorous? Trustworthiness and authenticity in naturalistic evaluation. *New directions for evaluation*, 2007(114), 11-25.
- Scott, T. M. (2007). Issues of personal dignity and social validity in schoolwide systems of positive behavior support. *Journal of Positive Behavior Interventions*, 9(2), 102-112.

- Sheridan, S. M., Edwards, C. P., Marvin, C. A., & Knoche, L. L. (2009). Professional development in early childhood programs: Process issues and research needs. *Early Education and Development, 20*(3), 377-401. doi: 10.1080/10409280802582795
- Simon, F., & Donohue, C. (2011). Tools of engagement: Status report on technology in early childhood education. *Exchange (19460406)*, (199), 16-21.
- Simon, F., Nemeth, K., & McManis, D. (2013). Technology in ECE classrooms: Results of a new survey and implications for the field. *Classroom Technology, 68-75*.
- Simon, M. K., & Goes, J. (n.d.). What is Phenomenological Research?. Retrieved from <http://dissertationrecipes.com/wp-content/uploads/2011/04/Phenomenological-Research.pdf>
- Simon, M.K. & Goes, J. (2013). *Scope, limitations, delimitations*. Retrieved from <http://dissertationrecipes.com/wp-content/uploads/2011/04/limitationscopedelimitation1.pdf>
- Szyjka, S. (2012). Understanding research paradigms: Trends in science education research. *Problems of Education In The 21St Century, (43)* 110-118.
- Taylor-Powell, E., & Renner, M. (2003). *Analyzing qualitative data*. University of Wisconsin--Extension, Cooperative Extension.
- Tufford, L. & Newman, P. (2012). Bracketing in qualitative research. *Qualitative Social Work, 11*(1), 80-96.
- Turja, L., Endepohls-Ulpe, M., & Chatoney, M. (2009). A conceptual framework for developing the curriculum and delivery of technology education in early

- childhood. *International Journal of Technology and Design Education*, 19(4), 353-365. doi: 10.1007/s10798-009-9093-9
- Tyack, D. B., & Cuban, L. (1995). *Tinkering toward utopia: A century of public school reform*. Cambridge, MA: Harvard University Press.
- Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wang, F., Kinzie, M. B., McGuire, P., & Pan, E. (2010). Applying technology to inquiry-based learning in early childhood education. *Early Childhood Education Journal*, 37(5), 381-389. doi: 10.1007/s10643-009-0364-6
- Wartella, E., Blackwell, C.K., Lauricella, A.R., Robb, M.B. (2013). Technology in the lives of educators and early childhood programs: 2012 Survey of Early Childhood educators. *Latrobe, PA: The Fred Rogers Center for Early Learning and Children's Media*.
- Watson, S. L., Watson, W. R., & Reigeluth, C. M. (2008). Systems design for change in education and training. *Handbook of research on educational communications and technology*, 691-701.
- Wavering, M. (2011). Piaget's logic of meanings: Still relevant today. *School Science And Mathematics*, 111(5), 249-252. doi: 10.1111/j.1949-8594.2011.00083
- Wood, E., Gottardo, A., Grant, A., Evans, M. A., Phillips, L., & Savage, R. (2012). Developing tools for assessing and using commercially available reading software programs to promote the development of early reading skills in children. *NHSA Dialog*, 15(4), 350-354.

Yin, R.K. (2003). *Case study research: Design and methods* (3<sup>rd</sup> ed.). Thousand Oaks, CA: Sage Publications.

Yin, R. K. (2009). *Case study research: Design and methods* (5<sup>th</sup> ed.). Thousand Oaks, CA: Sage Publications.

Yin, R. K. (2011). *Applications of case study research*. Thousand Oaks, CA: Sage Publications.

## Appendix A: Request to Conduct Research

2014-2015

<p><b>Name of Applicant:</b> _____</p> <p><b>Employee of [redacted]?</b> Yes ___ No ___</p> <p><b>If yes, location and position</b> _____</p> <p><b>Is the research in fulfillment of graduate program requirements and/or in partnership with an external organization (e.g., university, college, business, industry, agency, etc.)?</b> Yes ___ No ___</p> <p><b>If yes, name of external organization and lead contact person:</b></p> <p><b>External organization:</b> _____</p> <p><b>Lead Contact Person and Position:</b> _____</p> <p><b>Purpose of research:</b></p> <p>_____</p>
---

**Submission Requirements**

1. A copy of the complete application submitted for formal approval by a human subjects review board. This application should include, at a minimum:
2. A summary of the purpose and scope of the research including:
  - a. \_\_\_ The extent to which the research addresses and/or aligns with the goals of the school district
  - b. \_\_\_ Potential benefit of the research to positively impact district, building, or classroom practice.
3. A brief summary of the research methods including:
  - a. \_\_\_ Participants
  - b. \_\_\_ Selection process
  - c. \_\_\_ Remuneration procedures (if applicable)
  - d. \_\_\_ Assurance of confidentiality of participant identification
  - e. \_\_\_ Consent and assent procedures and documents
  - f. \_\_\_ Activities related to the research, including proposed survey, interview, and/or assessment questions/instruments
  - g. \_\_\_ Extent of intrusiveness/disruption regarding classroom instruction



- h. \_\_\_\_ Time/effort requirements of participants
- 4. Evidence to demonstrate that the proposed research has been formally approved through a human subjects review process.
- 5. Assurance from the researcher that building principals, teachers, students and/or their parents may opt out of participation without consequence even with approval by the district team.
- 6. Assurance from the researcher that results will be communicated back to the district upon completion of study. (**Anticipated date of completion:** \_\_\_\_\_)

Date received by Director of Research, Evaluation & Accountability: _____
Team Review Date: _____ Approved: ____ Not Approved: _____
Signature of Associate Superintendent _____
Date: _____
Signature of Principal(s) of building(s) impacted by research study: _____
Date: _____

## Appendix B: Letter of Cooperation

XXXXX Schools  
Dr. XXXXX  
Director of Research, Evaluation and Accountability  
Department of Academic Services  
XXXXX Schools  
XXXXXX  
XXXXX  
Office: XXX-XXX-XXXX  
Fax: XXX-XXX-XXXX

September 4, 2014

Dear Heather White,

Based on my review of your research proposal, I give permission for you to conduct the study entitled Early Childhood Teachers' Perspectives of Developmentally Appropriate use of Computer Applications within the [REDACTED] Schools. As part of this study, I authorize you to ask for permission from school principals to allow their staff to participate in the study.

The researcher will then:

- Use a non-random purposeful, but voluntary method for acquiring participants in approved school buildings. All early childhood education teachers, including early childhood special education teachers, at participating schools will be offered the opportunity to participate in the research study via an e-mailed letter of invitation, including an informed consent form.

Teachers who desire to participate will:

- Be requested to reply, via e-mail, stating their consent and willingness to participate. The first 10 early childhood teachers and/or early childhood teachers who agree to participate in the study will form the research sample.

The researcher will contact the participants via district email and/or telephone calls to set up 1:1 interviews.

We understand that our organization's responsibilities include:

- Allowing this researcher to contact early childhood and early childhood special education teachers to ask for their participation and consent to participate in this research study.

- This organization recognizes district e-mail will be used for correspondence. We reserve the right to withdraw from the study at any time if our circumstances change.

As part of this study, I authorize you to do a document analysis by collecting the local school district's both printed and electronic information on professional development activities on DAP, documents reflecting the funding for technology, and the school district's technology plan.

I confirm that I am authorized to approve research in this setting.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the research team without permission from the Walden University IRB.

Sincerely,  
Authorization Official  
Contact Information

Walden University policy on electronic signatures: An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically. Electronic signatures are regulated by the Uniform Electronic Transactions Act. Electronic signatures are only valid when the signer is either (a) the sender of the email, or (b) copied on the email containing the signed document. Legally an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. Walden University staff verify any electronic signatures that do not originate from a password-protected source (i.e., an email address officially on file with Walden).

## Appendix C: E-Mailed Letter / Consent Form

Hello, I am Heather White, a doctoral student at Walden University and a speech-language pathologist for the XXXX. I am inviting you to take part in my research study. I am requesting that you be a participant in this research. This e-mail will outline the purpose of the research, give you more details about being a participant and is requesting your reply to consent to be a participant.

You are invited to take part in a research study for the inquiry of teacher perspectives about the use of developmentally appropriate practices (DAP) while embedding technology into early childhood classrooms.

I am inviting all early childhood teachers and early childhood special education teachers in the [REDACTED] to be interviewed for this study. This form is part of a process called “informed consent” to allow you to understand this study before deciding whether to take part.

**Background Information:**

Teachers are embedding new computer applications into the early childhood classroom. However, there is no evidence that early childhood teachers are implementing developmentally appropriate practices (DAP). Therefore, the purpose of this study is to identify early childhood teachers’ perceptions about the use of developmentally appropriate computer applications within their classroom in a large urban school district. In addition, this research is collecting potential strategies based on what early childhood teachers believe to be the best way to implement change toward using developmentally appropriate computer applications?

**Procedures:**

If you agree to be in this study, you will be asked to:

- Sign this letter with, **“I consent”**.
- Meet in an agreeable and neutral and private location to respond to interview questions.
- The interview will take approximately 45 to 60 minutes.
- The interviews will be audiotaped for the purpose of accurately capturing the participants’ responses.
- The researcher will take notes during the interview.
- No answer is incorrect, you will be answering questions based on your current practices within your classroom.
- At any point in during the interview you can ask to stop and take a break or quit altogether.

- Each participant will be provided with an individual copy of the researcher's findings for his/her own data via e-mail. The participants will review the findings and meet, if needed, to discuss the findings (approximate time: 30-45 minutes).

Here are some sample questions:

- What computer software programs do the children have access to in your classroom?
- What forms of technology are used in your classroom?
- Tell me about your previous trainings or professional development opportunities that have been related to implementing technology into the early childhood classroom.
- Explain to me what developmentally appropriate practices means to you as an educator.
- What strategies have you found to be helpful with regard to using technology in your classroom?

#### **Voluntary Nature of the Study:**

This study is voluntary. Everyone will respect your decision of whether or not you choose to be in the study. No one in the [REDACTED] District will treat you differently if you decide not to be in the study. If you decide to join the study now, you can still change your mind later. You may stop at any time.

#### **Risks and Benefits of Being in the Study:**

Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress or becoming upset. Being in this study would not pose risk to your safety or wellbeing.

The potential benefits of this study are to uncover common themes that reveal teachers' perspectives of developmentally appropriate use of computer applications and possible strategies for improving implementation of DAP. These themes may yield better guidelines, checklists, professional development topics, or screening tools for purchasing computer software.

#### **Payment:**

The participants will not receive compensation for their participation in this study.

#### **Privacy:**

Any information you provide will be kept confidential. The researcher will not use your personal information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in the

study reports. Data will be kept secure by maintaining all survey question responses in a locked drawer in the researcher's home. Data will be kept for a period of at least 5 years, as required by the university.

**Contacts and Questions:**

You may ask any questions you have now. Or if you have questions later, you may contact the researcher, Heather White, at xxx.xxx@xxx.xxx or (xxx) xxx-xxxx. If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is xxx-xxx-xxxx. Walden University's approval number for this study is 09-03-14-0302672 and it expires on September 2, 2015

The researcher will give you a copy of this form to keep.

**Statement of Consent:**

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By replying to this e-mail with the words 'I Consent', I understand that I am agreeing to the terms described above.

Please contact me for more information xxx.xxx@xxx.xxx or call me at xxx-xxx-xxxx.  
Thank you!

Heather White, Researcher

## Appendix D: Early Childhood Teachers' Interview Questions

### Demographics

1. How long have you been an early childhood teacher?
2. Have you worked with other ages?
3. How long have you worked in this district?

### Perspective on technology

4. Tell me about the technology you use in your classroom for instruction.
5. Tell me about the technology the children use in your classroom.
6. Tell me about the ways in which the children access technology in your classroom (ex. touchscreen, mouse, joystick, keyboards).

### Developmentally Appropriate Practices

7. What does developmentally appropriate practice mean to you?
8. Tell me how you decide what computer applications to use in your classroom.
9. Tell me how it is decided which children play on the computer.
10. Tell me how it is decided which computer program/application the children use of the computer.
11. What suggestions do you have for other teachers for implementing change toward using developmentally appropriate computer applications?
12. What suggestions would you give to the administrators for facilitating the use of DAP?
13. What strategies have you found to be helpful with regard to using technology in your classroom?

14. Tell me who the major stakeholders are in your setting.

Teachers' training / experience with technology

15. Tell me about the computer training you received in college.

16. Tell me about the computer training you have received while being employed in this district.

17. Tell me about the training you have received on implementing computer applications into your early childhood classroom.

Potential Probes, used as needed

1. Can you explain,
2. Can you give me some examples
3. What other things do you consider when \_\_\_\_.