A STUDY TO DETERMINE THE IMPACT OF PROFESSIONAL DEVELOPMENT ON

TEACHERS' KNOWLEDGE OF LITERACY CONTENT

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CHAPTER I

INTRODUCTION

Background

Conducted in Belize, this study aimed to investigate the elements of professional development programs that have a positive impact on teachers' knowledge of the content for early literacy instruction. Research designed to determine the impact of professional development on teachers' learning is limited (Borko, 2004). According to Borko, most of the evidence supports the fact that professional development has the potential to positively impact teachers' practice. There is, however, limited evidence on the evaluation of professional development to investigate how these programs contribute to teachers' learning. Additionally, most of the seminal research on the impact of professional development is in Science and Mathematics. Garet, Porter, Desimone, Birman and Yoon (2001) examined the effects of professional development on teachers' mathematics and science content and the teachers' ability to implement programs of study in these areas. A similar initiative was conducted by Penuel, Fishman, Yamaguchi and Gallagher (2007) which was designed to evaluate the impact of a science program.

Accordingly, there is need for more research on reform approaches to professional development and the impact of such efforts on teaching and learning (Garet et al., 2001). To improve students' performance, teachers must have a clear understanding of the subject matter they teach and the way students learn content in that particular area (Borko, 2004). The assumption that when teachers have strong content knowledge, they teach better has led to numerous efforts to promote teachers' content knowledge in the various disciplines in an attempt to improve the quality of education (Poulson, 2001). Given the connection between teachers'

content knowledge and students' performance, an investigation to determine the impact of professional development on teachers' knowledge of literacy content can inform the process of teacher development programs in this area.

The success or failure of students' literacy development can be attributed to several different factors. While there is no doubt that the individual characteristics of students play a major role in learning to read, the quality of instruction is a significant factor as well. With the increasing demands for education - particularly in developing countries with limited resources - there is a growing body of literature addressing the quality of instruction (Darling-Hammond, 2006; United States Agency for International Development (USAID) Report, 2006). Research consistently identifies teachers, whole school efforts and communities as the forces that drive quality. Evidentiary support indicates that teacher quality plays a critical role, with some research suggesting that it is the most important factor in relation to students' achievement (Akiba, LeTendre & Scribner, 2007; Darling-Hammond, 2009; Progress in International Reading Literacy Technical Report, 2001**).**

Research on professional development can provide valuable insights to help policymakers understand the needs of teachers and what support structures are most likely to improve teachers' practice and by extension students' performance. Darling-Hammond (2009) argued that for any meaningful change to take place within the educational system, schools must adopt a professional development approach to teaching that requires teachers to be '*competent and committed.*' In order to realize this goal, teachers must go through ongoing rigorous training and professional development that takes into account their respective school context. Cognizant of this factor, researchers and those involved with educational reform are increasingly turning

their focus to teacher factors in their quest to improve the quality of education (Akiba et al., 2007).

Policymakers across the globe are focusing on upgrading their teachers' level of performance as a means of improving the quality of education (Darling-Hammond, 2009). Endorsing this position, Akiba et al., (2007) argued that improving certification standards will have a positive effect on the quality of teaching, student achievement and economic development. Notwithstanding, in the research that has contributed to what is defined as 'best practices' in early literacy, there is evidence that teacher certification programs do not always yield the desired quality of teachers needed to transform educational practices in the classroom (McCutchen et al., 2002).

Teacher Education in Belize

In concert with regional and international efforts, the Government of Belize has taken on several initiatives aimed at improving the quality of life for all Belizeans by improving infrastructure, health and education (Belize Ministry of Education, 2007). In regards to education, improving teacher quality has been one of the priority areas from as far back as 2000.

Cognizant of the role of teacher development in educational reform, the Ministry of Education enacted licensing of teachers in August 2000 ("Ministry of Education", 2000). This was a critical milestone in the history of teacher education in Belize, given that traditionally, teachers enrolled in teacher preparation programs while they were in-service. This in-service approach to teacher training shares some characteristics of alternative models of teacher preparation in the United States, with some striking differences. First, the entry level is different. Teachers in the United States accessing alternative programs are more likely to have a college degree, unlike their counterparts in Belize, who would be for the most part "high school or sixth

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form graduates" (Thompson, 2008). Secondly, novice teachers in the Belizean system may be in the classroom for years before they access training (Thompson, 2008).

This practice of in-service training has persisted over the years, despite government's effort to move teacher training in the direction of pre-service by offering associate level teacher training through junior colleges established in every district within the country of Belize. This was done to ensure that all teachers entering Belizean classrooms would have a minimum of an associate's degree in teaching. A decade later, only 42.5% of primary school teachers in the system have professional training (Belize Ministry of Education, 2008/09).

Teachers in Belize are required to accumulate 124 hours of professional development over every five year period in order to maintain a license to teach (Belize Ministry of Education, 2010). This requirement has increased the number of professional development sessions offered to teachers, especially during the summer. The number of teachers attending these sessions has also increased dramatically. Nonetheless, while government is spending more funds on professional development, there is currently no documented evidence to verify the extent to which this effort is impacting the quality of teaching and learning in Belizean classrooms.

Many Belizean teachers, particularly those who are uncertified, find the teaching of literacy challenging. One reason for the difficulties associated with teaching this area of the curriculum is rooted in the fact that Belize is a multicultural society. As a result, students bring various strains of language to the classroom. While it is important to nurture children's first language and their heritage, they are required to learn English for academic purposes. English is the official language and medium of instruction. Furthermore, all educational materials used in Belizean classroom are printed in English. In this context, children must develop literacy skills in English in order to succeed academically.

The goal of the literacy program in Belizean classrooms is aimed at helping students to master English for academic purpose while celebrating their native language. To facilitate this process, teachers need to understand the fundamental principles and content of literacy development in young children. Additionally, they must acquire the skills needed to foster language and literacy development in the second language. Students' failure to meet benchmarks is often attributed to teacher factors such as their level of subject knowledge and pedagogical skills (Akiba, et al., 2007; Darling-Hammond, 2009; Progress in International Reading Literacy Technical Report, 2001; USAID, 2008).

National examination results continue to indicate that a large number of students are not meeting the benchmarks in language arts. Belize Ministry of Education's *Abstract of Educational Statistics* (2008/09), for example, reflects the following:

- 70% of the students taking the exit examinations at the end of Standard VI (grade 8) achieved below satisfactory level in the core subject areas;
- approximately 10% of students in Infant I will not complete primary school and
- repetition rate is 9.4%.

While there is documented evidence to support the claim that professional development has a positive impact on the quality of teaching, there is often a discontent among educators about the quality of these initiatives. One-day, isolated professional development sessions without follow-up built in often leave teachers with questions and a level of uncertainty about how to apply new ideas in the different contexts in which they operate (Pradere, 2007). Uncertainty and anxiety about change can have a negative impact on teachers' level of commitment to implement the new strategies. Schools do not reap the benefit of professional

development, in many instances, simply because some teachers fail to move from learning new concepts and strategies to the application of these techniques in their classrooms.

These are legitimate reasons for concern precisely because efforts to improve teacher quality can be costly, both in terms of financing and in the amount of time invested especially by teachers themselves. So as educators and policymakers invest more funds into school improvement by focusing on raising the quality of teachers in schools, they are simultaneously challenging professional development practices, especially when teachers continue to experience a sense of unpreparedness and when there is minimal evidence of the desired change being implemented and sustained (Darling-Hammond, 2000; Guskey, 2003).

In a move toward the improvement of literacy instruction, the government of Belize signed on to the Caribbean Center for Excellence in Teacher Training Project in 2003. This was a regional literacy improvement project funded by USAID. The focus of the program in Belize was to develop teachers' capacity to teach literacy in the early grades. While there is documented evidence to support the impact of the program on students' literacy skills in the project schools, there is limited documented evidence that speaks directly to changes in teachers' knowledge and practice in relation to literacy instruction.

Research in the area of professional development provides policymakers and those responsible for educational reform with a clear understanding of what makes these programs effective. Having this knowledge can facilitate the planning of effective interventions for teachers. Understanding the needs of teachers and students is also critical to the process of planning professional development geared toward improving the quality of teaching and learning. Research in the areas of mathematics and science has outlined some guidelines for effective professional development. In regards to mathematics, Hiebert (1999) stated:

Research on teacher learning shows that fruitful opportunities to learn new teaching methods share several core features: (a) ongoing (measured in years), collaboration among teachers for purposes of planning with (b) the explicit goal of improving students' achievement of clear learning goals, (c) anchored by attention to students' thinking, the curriculum, and pedagogy, with (d) access to alternative ideas and methods and opportunities to observe these in action and to reflect on reasons for their effectiveness. (p. 15)

While many of these points are discussed in the literature, there is limited evidence to determine how these features interact to improve teacher learning and practice. Some studies, for example, suggest that professional development programs that incorporate most or all of these elements are more effective (Garet et al., 2001). A number of more recent studies indicate that duration plays a critical role in the extent to which teacher change is influenced (Garet et al.; Hiebert, 1999; Penuel et al., 2007). Additionally, much of the research highlights the fact that professional development with a focus on specific content area, including strategies to support students' learning in the subject area is useful (Poulson, 2001). Notwithstanding, Garet et al. (2001) argued that few studies have actually compared the effects of different approaches to professional development. This study attempts to add to the body of literature by investigating the effects of the traditional workshop model verses ongoing school based intervention incorporating coaching on teachers' understanding of literacy content.

Literacy Education in Belize

The National Curriculum for Language Arts from the Ministry of Education in Belize outlines the policy, expected learning outcomes and suggested instructional strategies for the primary level. The policy mandates an integrated approach and recognizes the importance of

using children's first language to facilitate the development of language and literacy in standard English. Learning outcomes are grouped under listening, speaking, reading, viewing and writing. The methodology encourages teachers to integrate the components of language within the language arts block, as well as across subject areas. In a multilingual society such as Belize, teaching language and literacy skills across subject areas is critical, since it gives students greater access to listening, speaking, reading, viewing, and writing in the standard form. Teachers are, for example, encouraged to use children's literature to stimulate and develop critical analysis and interpretation, as well as communication skills in English (Bradley, 2001).

An estimated 33% of our students attend preschool between ages three to five (Belize Ministry of Education, 2009). During the preschool years, students are exposed to the foundation skills for literacy (Ministry of Education, 2006). Mathes and Torgesen (1998) indicated that students' knowledge of phonological awareness and their level of vocabulary are predictors of their level of readiness for reading instruction in the early grades. According to Coyne and Harn (2006), these skills form the foundation on which subsequent skills and strategies are grounded.

As a result, young children entering the primary level with preschool experience have an advantage over those who have not had that exposure. Given that the foundation skills developed in the years before kindergarten (Infant I in the Belizean context) are essential to reading success in the later grades (National Institute of Child Health and Human Development, 2000), students who lack these prerequisites are at risk in terms of their literacy development (Bradley, 2001). To compound the problem, children in the Belizean context are generally not screened upon entry to formal education to determine their reading level. Additionally, language arts is often taught to a large group of students without consideration for individual differences

and learning needs. Given that the foundation skills are critical to future reading success in school, Coyne and Harn (2006) argued that it is important to assess these skills at an early stage, so as to provide teachers with valuable data on students' literacy development and their instructional needs.

Problem and Purpose

Belizean teachers currently have greater access to professional development sessions. These programs are designed to improve teachers' knowledge and skills; however, at present there is very little evidence to verify the impact of these sessions on teachers' knowledge. Without this information, it is difficult to plan effectively to meet the needs of teachers.

Several factors can negatively impact teachers' learning during professional development sessions. These include teachers' level of motivation, the amount of information being covered, the time factor and the extent to which topics addressed in these sessions meet the individual needs of teachers and are aligned with the goals of the school (Garet et al., 2001). The evaluation of professional development must, therefore, seek to measure the extent to which these programs influence changes in teachers' knowledge, practices and/or students' learning. This first initiative is directed at evaluating the impact of professional development on teachers' literacy content knowledge.

Research Questions

This study was designed to bring to the forefront elements of professional development programs that contribute to the development of teachers' knowledge of literacy. Given the link between teachers' knowledge and students' performance (Borko, 2004), an understanding of teachers' knowledge base and their needs as literacy instructors is critical in the move toward improving students' literacy performance and the overall quality of education in Belize. With an

understanding of the processes and strategies that best support teachers' profound understanding of the content needed to teach literacy, policy makers and school leaders can better facilitate teachers' ongoing professional development. To this end, the current study investigated the following specific research questions:

Research Question 1

Were there differences in the means of teachers' literacy content knowledge scores as measured by Literacy Instruction Knowledge Survey (LIKS) administered at three different time periods?

Research Question 2

Were teachers' performance scores in any one area of literacy content significantly higher than in the other areas?

Research Questions 3

Did teachers' years of experience influence their literacy content knowledge scores during training as reflected by their score on LIKS?

Research question 4

Did teachers' level of qualification influence their literacy knowledge scores during training as reflected by their score on LIKS?

To answer the specific research questions, this quantitative study was designed to measure teachers' literacy knowledge over three time periods to determine which of two phases of intervention had the greater impact. Furthermore, the research investigated whether teachers' years of experience or level of qualification influenced their performance on the knowledge surveyed.

Definition of Terms

The following list of terms was defined to maintain consistency in the interpretation of the content and to facilitate the reading of the study.

Caribbean Center of Excellence for Teacher Training Literacy Program (CCETT)*:* A regional literacy project designed to improve the skills of teachers of early literacy in Caribbean countries including Belize. The focus on early literacy in CCETT closely resembles the foundational skills as presented in the *National Institute of Child Health and Human Development (2000).* These include: phonological awareness, phonics and word study, vocabulary development, fluency, comprehension, writing and oral language development.

CCETT Model: training focusing on the use of students' diagnostic data to plan, implement, and monitor and evaluate interventions designed to address the needs of all students, especially struggling readers. The training is designed to help teachers understand the components of early literacy and the strategies that facilitate early literacy development.

Infant Department: In the formal school setting in Belize, the Infant Department includes primary grades of Infant I, Infant II, Standard I. For the purpose of literacy intervention through the Ministry of Education, standard II students are targeted. So, for the purpose of this study, Standard II will be included in the Infant Department because it is considered as part of the target audience for early literacy intervention in Belize. The age range for children in these grades is typically from five to eight years old. These students are still in the early childhood range, hence the rationale for the focus of early literacy in these grades.

Levels of Teacher Certification in Belize: Prior to 2000, the training of teachers in Belize was mainly in-service. That means that the majority of teachers entered the professional with only a high school diploma or in some instances with six form certification (equivalent to first

two years of a first degree). So generally, teachers applied to do their professional training after being in the classroom for several years. In an effort to change this practice and ensure that all teachers have at least a minimum level of training before they enter the classroom, several initiatives were implemented. Levels of teacher training now vary to reflect the following: Level I teachers (one year of formal teacher training); level II (two years of formal teacher training); associate in teaching; bachelor's degree.

Multi-grade School: School with more grades than there are teachers. In this case, two or more classes are combined (The Commonwealth Secretariat and the Association for the Development of Education in Africa, (2005).

Sixth Form: In the Belizean context, sixth form refers to the first two years of study in Junior Colleges immediately after high school.

Summary

Chapter 1 introduced the research topic and established the research context by providing an overview of teacher education in Belize. With less that 50% of teachers in the educational system formally trained, professional development is critical. It is the vehicle that provides support and training to in-service teachers.

The discussion on the Belizean education system and literacy education in Belize highlighted some of the challenges in justifying the need to improve the quality of instruction through more effective professional development programs. With increased access to basic education, the question of quality teaching is an imperative one.

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CHAPTER II

LITERATURE REVIEW

Introduction

Chapter two presents the review of literature under the following headings: challenges faced by researchers in this field, features of effective staff development, staff development and teacher learning, characteristics of effective teachers of early literacy instruction. The final section introduces the theoretical framework that guided the research.

Designed to improve students' performance, many educational reforms are directed at improving teachers' content knowledge and pedagogical skill (Desimone, 2009; Garet et al., 2001; Murchan, Loxley & Johnston, 2009). There is little or no evidence of school improvement occurring without professional development intervention (Guskey, 2009). The link between teachers' performance and students' achievement is the driving force behind professional development (Ancess, 2002; Borko, 2004).

Given that the ultimate goal of staff development is to positively impact students' achievement, there is a need to design more studies that measure the impact of professional development on students' learning (Darling-Hammond, 2000; Gordon, 2005; Guskey, 2002; Joyce & Showers, 2002). While Hughes, Cash, Ashwee and Klinger (2002) endorsed this position, they argued that professional development that seeks to improve teachers' content knowledge in a particular discipline also improves teachers' pedagogical skills in that area. As a result, teachers' understanding of specific content and how to teach it is a necessary first step to improve students' learning.

To better understand the features of effective professional development that facilitate teacher learning, this literature review focuses on five main themes. The first section discusses

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the challenges faced by researchers in the field of professional development. The second section examines features of effective professional development. The third section highlights the teachers' learning in the context of professional development. Section four synthesizes research findings on characteristics of effective teachers of literacy and the final section introduces the theoretical framework that guided this study.

Challenges Associated with Professional Development Research

In an article entitled *Closing the Knowledge Gap on Effective Professional Development*, Guskey (2009) indicated that there is a gap between our beliefs of what makes professional development programs effective and documented scientific evidence to validate such claims. While Desimone (2009) argued that we can use available research to judge the effectiveness of such programs, Borko, Jacobs, Eiteljorg, and Pittman (2008) maintain that there is little consensus on what constitutes effectiveness. Desimone (2009) argued that the wide array of activities that contribute to teacher learning makes it difficult to determine causal relationship between intervention programs and teacher learning.

Guskey (2009) cited other challenges that thwart efforts to collect evidence of effective professional development programs. He insisted that the complexity of educational reform makes it difficult to isolate the effects of a single intervention. Schools are seldom involved in one innovation at a time. Guskey also cited time and limited resources as challenges that limit the quality of research in this field. As a result, researchers are challenged to design studies to highlight trends, relationship, and impact of a professional development intervention on teachers' knowledge, instructional practice, and students' learning outcomes (Desimone, 2009). Given these challenges, Desimone posited that the focus should be on measuring those features of

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professional development that contribute to high quality teaching and improved students'

performance.

Features of Effective Professional Development

According to Garet et al. (2001), professional development can be classified as either

traditional or reform type. The traditional approach to professional development encompasses

workshops, short courses, conferences, and institutes, most of which take place at a centralized

location, away from the classroom environment. Currently, these are often criticized in light of

their potential to change teachers' practice based on the duration of these activities, the lack of

active learning, and the lack of content focus necessary to build teachers' knowledge base

(Birman, Desimone, Porter & Garet, 2000).

In response to this criticism, reform type professional development has emerged. It

differs from the traditional approach mainly in respect to context. Reform type professional

development is generally school based, incorporating coaching and mentoring to support

teachers at the classroom level. This model also encourages training over a period of time, as it

engenders collaborative learning among staff members. Based on their review of the literature

Birman et al. (2000) reiterated the value of this approach to professional development citing

form, duration and participation as critical features. Additionally, they found teacher

intervention programs that were aligned closely with the instructional goals of teachers were

more likely to be sustained over time (Desimone, 2009).

Consequently, current research has delineated some common standards that

characterize effective professional development (Correnti, 2007). These guidelines are aligned

with those of professional organizations such as the National Staff Development Council, the

National Institute for Science Education, and the American Federation of Teachers (Corcoran,

Mckay, & Riordan, 2003 as cited in Correnti, 2007). In their research, Garet et al. (2001) established a model of effective professional development that emerged out of the evaluation of Eisenhower's Professional Development Program. Tested nationally in the United States, this model has demonstrated consistency (Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet et. al., 2001; Penuel, et al., 2007).

Using a sample of 1,027 teachers who had experience with either the traditional or reform type professional development program, Garet et al. (2007) conducted a survey to compare teachers' perception of the efficacy of the different programs on their learning. The types of activities were coded as either traditional (workshops, college courses, and conferences) or reform type (study groups for teachers, mentoring/coaching, networking, and collaborative committees). The measures included (a) type of activity, (b) duration, and (c) the extent to which the activity was directed at a group of teachers from the same school as opposed to individual representatives. The researchers also investigated the following three features: (a) the extent to which the activity was focused on a specific content area; (b) to what extent the activity encouraged teachers to engage in the learning process; and (c) the extent to which the activity was aligned with teachers' personal goals, as well as with those of the school and state.

The results of this study revealed that reform type activities are more effective than traditional approaches when (a) content is limited to a specific subject area, (b) teachers are actively involved in the learning process, and (c) when program activities recognize and are coherent with other aspects of teachers' professional work. Garet et al.found that when the intervention incorporated these three features, the program had a positive impact on teachers' content knowledge, skills and their classroom practices.

Content Focus

Research highlighting the impact of professional development on teachers' content knowledge of subject matter is limited (Garet et al., 2001). The content of professional development is generally directed at one of the following four goals: (a) to improve teachers' general content knowledge of the curriculum and their pedagogical skills; (b) to improve teachers' content knowledge in a specific discipline; (c) to improve teachers' overall pedagogical skills; and (4) to improve teaching practices, particularly classroom management (Hogan, Rabinowitz & Carvven, 2003).

To effectively deliver the curriculum, teachers must have a firm understanding of the subject matter they teach and the way students learn content in that particular area (Borko, 2004). According to Borko, teachers' knowledge of the content and how key concepts are interrelated are improved when professional development programs focus explicitly on one subject area. Bean and Morewood (2007) endorsed this position, claiming that professional development must focus on the content teachers need to teach in a particular subject area and how students learn such material. Programs focusing on subject matter and how students acquire such content have had greater success (Doppelt, Schunn, Silk, Mehalik, Reynolds & Ward, 2009). Such training not only equips teachers with knowledge to effectively deliver the curriculum, but provides teachers with the insights to detect when students are having difficulties (Quick, Holtz, & Chaney, 2009). Content and pedagogically savvy teachers are in a better position to make informed instructional decisions (Vrasidas & Zembylas, 2004).

Active Learning

Professional development must also incorporate activities that increase the chances of teachers incorporating and sustaining the initiatives in their classrooms. This is best achieved

through professional development activities that include classroom practice, coaching and collaboration among staff members (Pradere, 2007). Correnti (2007) and Quick et al. (2009) argued that the design of high quality professional development is a major factor that leads to increase in teachers' understanding of subject matter. They posited that the fundamental component of this design is the creation of learning cultures in which teachers at the school level work together to achieve common goals. This approach is consistent with features of how adults learn best. As adult learners, teachers' learning should be grounded in their experiences. The context, collaborating with peers and active involvement is critical to the process. Teachers construct their own understanding as a result of the group interaction rather than individually (Ball, 2009; Zellermayer & Margolin, 2004).

Guskey (2003) outlined six stages designed to get teachers to collaborate and be empowered to take on the responsibility of professional development, so as to bring about the desired changes in the school context. During the first phase, teachers are encouraged to use data, both of students and teachers, to set professional goals that can be measured and that are aligned with the goals of their school. According to Guskey, the benefit of this stage lies in the fact that teachers begin to think critically about their practice. In the second stage, teachers, with the support of instructional leaders, coaches, and their peers, begin the process of identifying and acquiring the tools, materials, curricula, and teaching strategies that will help them to achieve individual goals. Subsequently, during the third stage, teachers are encouraged to actively engage in the process of change by implementing what they are learning. They assume ownership by discussing what they are learning and coming up with strategies to overcome challenges. During this stage, teachers are motivated to continue the pursuit of professional development through collaborative efforts of the staff, evidence of success stories, and

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opportunities to lead and engage in research. According to Guskey, these incentives eventually translate into increased students' performance.

While Guskey (2003) cited reflection as the key component of stage four, he claimed, it is an integral part of the entire cycle. Good teachers constantly reflect on their practice. Reflective practice leads to a greater sense of self-awareness, strengths, weaknesses, and gaps in knowledge. During stages five and six, for example, teachers clarify misconceptions and set new goals based on evidence gleaned from evaluation of their performance and students' performance. The final stage of this model encourages the collection of evidence using multiple measures to validate claims of improvement. Ideally, the same measures used in stage one should be used in the final stage. When professional development utilizes reform type activities such as peer coaching, modeling, and small group discussions, teachers are more likely to be actively involved. These activities are integral to this process of professional development. They help teachers clarify and consolidate new ideas (Morrow & Casey, 2004).

Coherence

Teachers' content knowledge alone is not enough to create the changes necessary to improve students' literacy development (Justice, Mashburn, Hamre, & Pianta, 2008). For this reason, Ball and Cohen (1999) argued that context plays a critical role in promoting effective teaching. Effective professional development does not simply provide teachers with subject-specific content, but seeks to integrate the unique aspects of the school context and the way teachers learn and develop new skills. This is necessary to effect changes at the school level and more importantly in teachers' practices, if professional development is to have the desired impact on students' performance (Darling-Hammond & Richardson, 2009).

Garet et al. (2001) found that professional development that was connected to school goals and the work of teachers yielded improvement in teachers' content knowledge. Additionally, Corcoran, et al. (2003 as cited in Correnti, 2007) concluded that it was important for teachers to work collaboratively with each other within the context of their school to allow for the initiative to span over a period of time. Similarly, to be effective, the intervention must be aligned with curricular goals and assessment procedures, while simultaneously enhancing teachers' knowledge and skills.

To provide greater insights, Penuel, et al. (2007) used multiple data sources in their research to determine (a) types of professional development activities that yield higher levels of program implementation, (b) which activities had a greater impact on teachers' knowledge, and (c) how additional support after the initial training influenced teachers' content knowledge, and classroom practice. To determine changes in knowledge level and classroom practices, researchers surveyed 454 teachers from 28 international professional development service providers. The teacher survey also collected data on the implementation process, as well as the materials and support given to teachers.

Additional data were gathered from the survey for the service providers which focused on the design of the program and the background of trainers. An existing database of reports collected over time from teachers was used as an independent measure. The findings indicated that the alignment of professional development with school contexts and goals of teachers played a significant role in teachers' perceptions of the extent to which these initiatives prepared them for classroom practice. This research also indicated that teachers viewed professional development as more effective when it was extended over a longer period and incorporated technical support at the classroom level.

Creating Change

Staff development is designed to create change. To bring about the desired paradigm shift, the initiative has to be ongoing and linked to classroom practice (Pradere, 2007). Borko (2004) found that teachers who participated in subject specific workshops, followed by school based support offered over the course of a school year, displayed a deeper knowledge of the subject matter covered. To effect change in teachers' practice, they need training and support extended over a period of time (Blair, Rupley & Nichols, 2007). Birman et al. (2000) concurred that interventions extended over time facilitate content specific development and allow for more active engagement of the participants. In so doing, the activities are often practical and in alignment with teachers' work experience.

Morrow and Casey (2004) conducted a study over the duration of two years using 12 teachers from two schools serving disadvantaged and diverse student populations to corroborate the findings of effective professional development. The teaching experience of the teachers ranged from three to five years. During the first year of the study, the teachers participated in training for 10 weeks. The training provided the teachers with evidence-based practices to support early literacy instruction.

Subsequently, teachers were engaged in goal setting and planning for classroom implementation based on personal needs. Initially, the process was deliberately slow, recognizing that change takes time. During the implementation phase, participants received in-class support from literacy coaches, and they participated in study groups on a monthly basis. To document changes in teachers' knowledge and practices the following data sources were used: (a) teachers' responses to the survey instrument; (b) notes taken during classroom observation; (c) notes taken during the group meetings; and (d) interviews with individual teachers. The

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information gleaned from the data provided insights into teachers' perceptions toward changes that were required in the classroom and the components of the program that supported that change process. The findings highlighted the following as key components that facilitate change: setting personal goals; monitoring changes in students' performance; working collaboratively with peers; having the support of administration; working with the literacy coaches; allowing adequate time for change to occur; having study groups; having access to materials to support the program and observing other teachers in their classroom. A supportive learning community at the school level is critical to sustain efforts to change (Muijs, Harris, Chapman, Stoll, & Russ, 2004). When going through a process of change, working collaboratively with other members of staff and a coach reduces the level of anxiety for the adult learner (Zellermayer & Margolin, 2005).

Coaching

Neuman and Cunningham (2009) conducted a study using 291 early childhood sites to determine the impact of coaching on teachers' early language and literacy practices. Participants were randomly assigned to three groups. Group one received the course training, while group two received training in addition to ongoing coaching, and group three was the control group. Analysis of the results indicated a significant improvement in language and literacy practices of teachers who received training plus coaching.

Neuman and Wright (2010) conducted a similar study to determine the impact of professional development using 148 teachers of early literacy. They used a pre and posttest model to compare teachers' knowledge before and after the intervention. While there was no significant difference between teachers' knowledge before and after the intervention, there was significant difference in classroom application for those teachers who received coaching. Based

on the findings, the researchers concluded that coaching appeared to be an effective form of professional development.

Coaching seems to have the potential to effect changes that positively impact teachers' approach to literacy instruction. According to Bach and Poglinco (2004), coaches performed three main functions. They modeled teaching strategies, facilitated study groups, and helped to lead discussion meetings. Within this framework, coaches promoted the importance of reflection and goal setting. Neuman and Cunningham (2009) stressed that coaches also worked with teachers to identify strategies to achieve the goals outlined.

As a result of the potential benefits, coaching has become a topic of interest among educators (Neuman & Cunningham, 2009). Within the school context, the primary focus of coaching is to improve the quality of instruction. This is achieved by providing support to teachers in the classroom (Bean, Draper, Hall, Vandermolen, & Zigmond, 2010). Some researchers contend that the main function of coaches is to provide effective professional development to teachers (Hasbrouch & Denton, 2005; Walpole & McKenna, 2004). While coaching is about providing professional support to teachers, the ultimate goal is far more encompassing (Wadpole & Blamey, 2008).

Coaches are regarded as agents of change. Wadpole and Blamey (2008) conducted a study of literacy interventions in Georgia and found that principals regarded the role of coaches as building school capacity to sustain changes for improvement mandated by the state and district. In essence, coaches are responsible to lead school reform and have a large number of responsibilities (Bean et al., 2004). In this context, coaches must work closely with principals to ensure that their objectives are aligned with those of the leadership (Morrow & Casey, 2004).

Bean, Cassidy, Grumet, Shelton, and Willis (2002) conducted a survey of literacy coaches and found that while they were skilled and clearly understood their roles, they faced a number of challenges when working with teachers. First, the varied needs of teachers often made it difficult for coaches to schedule time to address their individual needs. Research indicates that despite the fact that the focus of the coaches should be on providing support to teachers to effect changes for school improvement, they spend less than 50% of their time working with teachers due to their involvement in other school related activities (McCombs & Marsh, 2009).

Teachers' perception of coaches was also a challenge. Some teachers failed to grasp the concept of coaches and viewed their role as limited to that of another teacher in the classroom. Finally, coaches felt that to be effective, they needed the full support of principals. Getting the process of coaching started in a school is often difficult, especially when the principal's and the coach's goals are not aligned (Bean et al., 2004).

Professional Development and Teacher Learning

While there is evidence to support the claim that professional development has a positive impact on teachers' practice and students' learning, there is limited research on what and how teachers learn from professional development programs (Borko, 2004; Desimone et al., 2002). Because learning occurs in different contexts, teacher learning must be studied in the different contexts in which they occur. Both the individual and the context in which he/she operates play an important role during the learning process.

In an attempt to expand our understanding of professional development programs and how they impact teacher learning, Borko (2004) posited that the process begins with recognizing that programs, teachers, facilitators and the context are all key elements of the initiative. To

contribute to the research on high quality teacher development programs, Borko proposed a three tier approach, with each level building on the previous one.

The goal of phase one is to investigate features of the program. In this case, it is suggested that researchers examine an intervention program and teachers as learners, in an attempt to understand the relationship between the two. According to Borko, the purpose of research in phase two is to study the same program delivered from multiple sites with different facilitators. In so doing, it is possible to examine the relationship among different facilitators, the program and teachers as learners. During phase three the scope widens to investigate multiple programs conducted at several different venues. The purpose at this point is to investigate the relationship among the four key elements of professional development.

Gaynell and Ballard (2010) indicated that in context of professional development programs, adult and experiential learning theories can enhance teacher learning. When tenets of these theories are incorporated into the design of programs, teachers are more likely to develop as reflective practitioners, taking on the responsibility for their own learning. From their perspective, this is possible because there is a close connection between learning and experience.

Adult learning emerged out of the concept of experiential learning. As such, andragogy is based on the principle that adult learners bring a wealth of experiences to the learning context. When tapped into, teachers' experiences serve to enrich learning (Gaynell & Ballard, 2010). Through modeling, teamwork and application, adults take responsibility for learning. New understandings are forged through hands-on activities. As adult learners, teachers can benefit from professional development programs that incorporate element of experiential and adult learning theories (Gaynell & Ballard).

According to Borko (2004), using teachers' documented evidence of practice can be a powerful tool to facilitate discussion and change. Consequently, classrooms are potentially first-rate context for teacher learning. This is not to say that professional development cannot take place outside of this environment. Using classroom artifacts such as lesson plans, samples of students' work and video clippings of teaching can be very effective during centralized training (Little, Gearhart, Curry & Kafka, 2003). Nonetheless, professional development training has a greater impact on teachers when it is incorporated at the school level as part of a school improvement plan designed to bring about change (Darling-Hammond & Richardson, 2009).

Darling-Hammond and Richardson (2009) argue that when training targets all the teachers from a school, grade level or department, it establishes a greater force for change. Teachers need a support group to nurture their professional growth (Grossman, Wineburg & Woolworth, 2001). To be effective, the learning environment must be one of trust. This is critical if teachers are to discuss issues, engage in risk taking, reflection and problem solving (Darling-Hammond & Richardson, 2009). Borko (2004) posits that communication, trust and collaborative efforts are critical elements of effective professional development initiatives. The goal is to establish a model that encourages teachers to work together as a unit to critique their present practice and to sustain changes for the long term.

According to Wenger (2005), the school is a community of practice. Inherent in the concept of community of practice is a way of learning as a group, constructing meaning and identity. From Wenger's perspective, learning is grounded in the socio-cultural theory, with emphasis on active participation as group members construct meaning and group identity. School based approach to professional development can support the development of

communities of practice. Collectively, staff members can participate to effect personal

transformative learning in their respective communities (Borko, 2004).

Establishing learning communities takes time and can be a difficult process (Grossman et

al., 2001). In coming together, teachers must develop rules of behavior to maintain the balance

between respect and critical analysis of teaching. Simultaneously, they must also learn to take

on the shared responsibility for the professional development of group members (Borko, 2004;

Seago, 2004). While teachers welcome the idea of discussing teaching strategies and content,

they find it more challenging to nurture the habit of engaging in critical discussion about

teaching (McLaughlin & Talbert, 2001).

Borko (2004) claims that similar to students, meaningful acquisition of knowledge for

teachers is a slow and uncertain process. During professional development programs, for

example, the level of impact varies from teacher to teacher. Borko also noted that some elements

of practice are easier to change than others. For example, teachers seem to acquire and use

strategies more readily than they are able to make instructional decisions based on feedback from

students.

Exemplary Teachers of Literacy

To meet the challenges of improving literacy, teachers in the Caribbean must embrace

certain characteristics and practices to improve their skills as literacy instructors (Warrican,

Down & Spencer-Ernandez, 2008). These teachers must first recognize that students bring

varying abilities, coupled with their cultural heritage and language, all of which impact literacy

development. To be effective, teachers must be able to diagnose students' strengths and

weaknesses and be able to use this data to plan effective instruction. Additionally, Warrican et

al. argue that exemplary teachers used an integrated approach to promote literacy. These

teachers view language as a communication tool, with the components–listening, speaking, reading and writing–as interconnected. This is exemplified by their ability to promote literacy through lessons that highlight the reading-writing connection.

Similarly, in a qualitative study designed to better understand the characteristics of effective literacy instruction, Morrow, Tracey, Woo and Pressley (1999) spent 25 hours observing each of the six participants. Results indicated that these exemplary teachers used a balanced approach to literacy instruction, engaging children in reading for meaning across a wide range of literary activities using thematic units that integrated content areas. Classrooms were print rich with materials that were challenging, while simultaneously allowing students to make choices, work independently and in small groups to facilitate social interaction. Time was allotted for explicit teaching that focused on the construction of meaning and problem solving skills. According to the study, participants' philosophies of the way children develop literacy skills were aligned with their classroom practices. Selected from three schools, all the participants worked in schools that expected outstanding performance. Teachers in those schools were encouraged to share and plan together by grade level and were exposed to frequent staff development activities. Pressley, Wharton-McDonald, Block, and Morrow (1998) cited similar characteristics of teachers who were considered experts at early literacy. They added that effective teachers of literacy ensured that students master both the lower level skills of decoding as well as higher order thinking to facilitate comprehension. To teach those skills effectively, the National Association of Bilingual Education, (2002) argued that teachers' content knowledge is a critical factor.

In trying to understand what content teachers must have in order to effectively develop students' literacy skills, it is important to note what content should be included in a strong

literacy program (McCutchen, Cunningham, Cox, Sidman & Covill , 2002; Moats, 2009; Moats & Foorman, 2003; National Institute of Child Health and Human Development, National Reading Panel, 2006). According to the International Reading Association, early reading instruction should focus on the following: phonemic awareness, phonics, vocabulary, fluency and comprehension. Moats (2009) suggested that in addition to the above, teachers need to understand the foundations of literacy and have a working knowledge of the linguistic structure of language, and how these elements relate to the sound system, meaning, grammar and overall organization of texts. This additional content is critical for effective reading and spelling instruction (Moats & Foorman, 2003).

Using a sample consisting of 59 teachers from kindergarten through to second grade, McCutchen, et al. (2002) investigated the relationship between teachers' knowledge of phonology and their practice and students' learning. They found that teachers' level of understanding of phonological awareness and phonics was related to their teaching of literacy and students' reading performance. In another study, McCutchen et al. (2002) attempted to measure content knowledge of teachers of early literacy and its development over time in relation to students' reading and writing performance. Pretest data reflected that teachers' content knowledge was low. After two weeks of intervention on phonological awareness, the reading-writing connection, spelling and vocabulary, posttest revealed a significant improvement in teachers' scores. In addition, after one year of follow-up with teachers, students in the experimental teachers' group got significantly higher scores when tested in phonological awareness, oral language, fluency, reading comprehension, spelling and writing. These researchers found that teachers' increased knowledge led to more explicit instruction of the components of reading. They concluded that a two week training with follow up over a one year

period can positively impact teachers' knowledge of literacy content and their classroom practice.

While it is clear that teacher quality plays a critical role in promoting students' achievement, training high quality teachers is still a challenge (Neuman & Cunningham, 2009; Strickland, Snow, Griffin, & Burns, 2002). To effectively prepare for the classroom, teachers of literacy must have a profound understanding of language and literacy (Dickenson & Brady, 2006). In short, their knowledge of the content must be strong (Neuman & Cunningham, 2009). Based on this premise, the National Association of Bilingual Education, No Child Left Behind Act (2002) created the impetus to improve teacher quality by demanding greater emphasis on professional development, especially those aimed at teachers of young children. In a similar fashion, the goals of the Caribbean Center of Excellence for Teacher Training, a literacy project in the Caribbean and Belize were aligned with the need to improve teacher quality (Caribbean Center of Excellent Proposal, 2003).

Theoretical Framework

In defining the adult learner, Eekelen, Boshuizen and Vermunt (2005) endorsed the constructivist view stating that learning is a '*self directed, active and knowledge-creating process*. They endorse the notion that hands-on experience and reflection plays a critical role in teacher learning. Similarly, the reality of ongoing changes in the environment dictates the need for on the job training as a means of influencing the learning process (Law & Hwee, 1997).

According to Fosnot (2005) knowledge is defined by a person's reality based on his/her personal experiences; it is adaptive rather that representative. This represents a shift from traditional epistemology that conceives of knowledge as determinate. In contrast, knowledge is constructed based on one's interaction with the world and reflecting on these experiences. As

the underlying theory, constructivism provides the framework that will be used to develop and

evaluate the effects of professional development on teacher learning and classroom practice.

Constructivism

The framework for this study is informed by socio-cultural and situated learning theories.

Both theories are supported by constructivism (Pella, 2011). As the underlying learning theory,

constructivism provided the framework that was used to develop and evaluate the effects of

professional development on teacher learning of content knowledge in the area of literacy.

Constructivism is one of the many learning theories that explain the way people acquire new

knowledge and skills. This theory by Piaget posits that learners actively construct knowledge by

modifying their cognitive structures called schema as they interact with, and adapt to the

environment (Tompkins, 2001). The constructs emerging from this theory are: (a) active

engagement of the learner, and (b) the role of the environment (Pella, 2011).

Vrasidas and Zembylas (2004) approached the discussion on constructivism from the

individual learner, as well as from a socio-cultural stance. They argued that the major difference

between these two views exists in where knowledge is constructed. From a personal

constructivist viewpoint, knowledge is constructed within the cognitive structures of the learner

based on his or her personal experiences. The social constructivist view on the other hand posits

that knowledge is constructed through the social interaction within the learning community.

Notwithstanding, personal and social constructivism cannot be regard as different since

knowledge is constructed both in the minds of the learner and through social interactions.

In his explanation of the social aspect of learning Wenger (2005) introduced the concept

of communities of practice. The theory behind communities of practice is that social

participation is the vehicle through which learning and development takes place. This process of

learning, Wenger argued, is not limited to the individual or an institution, but rather it is bound up in the communities of practice or norms that people establish based on shared goals and a common identity.

Cochran-Smith and Lytle (1999) outlined three models of how teachers learn. The first describes the learning process as the acquisition of knowledge gleaned from reading about best practices in the literature and from professional development training. The second model described teacher learning as the construction of new insights that occur as they reflect on their practical experiences. In the third model, Cochran-Smith and Lytle argued that much of what teachers need to learn about teaching is best generated within the context of the classroom and the school community.

According to Eekelen, et al. (2005), these models present the striking difference between the perceptions of how learning takes place. The first model characterizes the teacher as a passive learner, consuming knowledge as opposed to the active, self directed knowledge construction process typified in the second and third models. The researchers contend that the second and third models of teacher learning are aligned with the constructivist view of adult learners. From this viewpoint, building on teachers' experience is a critical component of the learning process in professional development programs. In the same way that teachers expect students to construct their own understanding of new concepts, teachers, as adult learners, are expected to actively engage and self regulate their own learning experiences in order to develop their expertise.

Key assumptions flowing out of the literature that guided the implementation of this study were: a) professional development must be over a period incorporating time for classroom application, feedback, and refining of knowledge and skills and b) professional development is

not limited to individual teachers, but must encourage the development of a community of learners and build capacity at the school level (Garet et. al. 2001; Neuman & Cunningham, 2008 & Porter, Garet, Desimone, Yoon, & Birman, 2001). This research used the model presented in the literature to determine the impact of professional development on teachers' knowledge of literacy instruction and their classroom practices in the Belizean context.

Summary

This research was informed by current literature on effective practices of professional development that are aligned with the way teachers learn and develop pedagogical skills. Key assumptions flowing out of the literature that guides the implementation of the study are (a) professional development must be over a period incorporating time for classroom application, feedback, and refining of skills, and (b) professional development is not limited to individual teachers, but must encourage the development of a community of learners to build capacity at the school level (Garet et al., 2001; Neuman & Cunningham, 2009). This research used the model presented in the literature to determine the impact of professional development on teachers' knowledge of literacy content. The conceptual framework is based on constructivism, adult learning in communities of practice and change theory.

CHAPTER III

METHODOLOGY

This chapter presents an overview of the research site followed by four main sections. The first section describes the participants. This is followed by the research design and a description of the instrument. The final section gives a detailed narrative of the data collection and analysis procedures.

Overview of Research Site

This study was conducted in one of Belize's six districts. The urban area within this district is referred to by the pseudo name 'Tapir Town' for the purpose of this study. The town has a population of 18,000 with an estimated 22,000 people living in the neighboring rural communities. Historically, a popular Mayan destination, Tapir is predominantly a Spanish speaking community. The economy in this part of the country is sustained by private enterprise farming and tourism afforded by the presence of Maya Ruins in the area (Statistical Institute of Belize, 2009).

Ten thousand students are registered in 36 elementary schools throughout the district, 12 of which are located in Tapir Town. Like the majority of students across the country of Belize, students in these schools enter the system speaking their home language, which is predominantly Spanish. The decision was made to limit the research setting at this time to the urban schools mainly to minimize cost and travel time that would have increased significantly if the remote schools were included.

Participants

This was a convenience sample drawn from a population of 143 teachers spread across the 12 urban schools in Tapir Town. Teachers in this locale are predominantly Hispanic, speaking both Spanish and English fluently. Participants represented eight schools that volunteered to be part of the research project, yielding a total of 61 teachers (Table 1).

Table 1

Experience and Qualifications of Participants

School	N of Teachers	Experience	N	Qualifications	N
1	8	0-5yrs.	3	No formal Training	2
		6-10 yrs.	2	*APE	4
		11-15yrs.		**BE/***TT or	2
		16-20yrs.	2	Higher	
		21+ yrs.	1		
2	2	0-5yrs.		No formal Training	
		6-10 yrs.		*APE	
		11-15yrs.		**BE/***TT or	2
		16-20yrs.	1	Higher	
		21+ yrs.	1		
3	17	0-5yrs.	6	No formal Training	3
		6-10 yrs.	4	*APE	3
		11-15yrs.	2	**BE/***TT or	11
		16-20yrs.	3	Higher	
		21+ yrs.	2		

4	4	0-5yrs.		No formal Training	2
		6-10 yrs.	1	*APE	1
		11-15yrs.		**BE/***TT or	1
		16-20yrs.		Higher	
		21+ yrs.	3		
5	8	0-5yrs.	4	No formal Training	6
		6-10 yrs.	2	*APE	2
		11-15yrs.	2	**BE/***TT or	
		16-20yrs.		Higher	
		21+ yrs.			
6	4	0-5yrs.	2	No formal Training	
		6-10 yrs.		*APE	3
		11-15yrs.		**BE/***TT or	1
		16-20yrs.	1	Higher	
		21+ yrs.	1		
7	3	0-5yrs.	1	No formal Training	
		6-10 yrs.		*APE	1
		11-15yrs.		**BE/***TT or	2
		16-20yrs.	1	Higher	
		21+ yrs.	1		
8	15	0-5yrs.	3	No formal Training	8
		6-10 yrs.	2	*APE	1
		11-15yrs.	2	**BE/***TT or	6
		16-20yrs.	2	Higher	
		21+ yrs.	6		

*Associate in Primary Education

**Bachelors in Education

***Trained Teachers' Diploma

Of the 61 teachers that originally consented to participate in the study, 13 dropped out during the course of the intervention. Of the 13 teachers that dropped out, 8 had 21 years of experience or more with either an associate in teaching or a higher degree. Teaching experience for the remaining 5 teachers that dropped out ranged from 0-5 years to 11-20 years. Qualification for these 5 teachers also varied. For example, three indicated that they had no formal training. Data reported is based on the 48 participants that completed the study.

Ninety percent of the participants were female and 10% were male. Participants reported that 16 of the 48 had 0-5 years of teaching experience. Ten had 6 to 10 years of experience, and the remaining 22 were in the classroom for over 10 years. Of the 48 teachers, 19 were trained at the bachelor's level or higher, while 17 had no formal training. Twelve teachers had their Associate Degree in Primary Education.

All teachers in the sample were teaching in the infant department. Teachers were drawn from the infant department because the improvement of literacy instruction in the early grades is consistent with the efforts of the Ministry of Education to provide better quality early childhood education. Subsequently, all teachers in the infant department of schools that agreed to participate were given informed consent forms seeking written permission from individual teachers (Appendix A). Participants were limited to all teachers in the infant department within the eight schools who submitted a letter of consent and those who completed all three rounds of the knowledge survey. The age of children at the infant level ranges from five to nine.

Research Design

Repeated measures analyses of variance (ANOVA) was used to compare the overall group means for pretest, posttest 1 and posttest 2 to determine the impact of training on teachers' knowledge of literacy content. Comparison of the overall mean scores for each area surveyed at

three different time periods was used to determine the area in which teachers appeared to be most knowledgeable and by extension, the content that they found most challenging. One-Way Anova was used to respond to questions 3 and 4 by comparing group means for experience and qualification of teachers on the pretest and the final posttest.

With this design the researcher used a pretest to collect a measure of each teacher's literacy content knowledge level before the intervention. This data was compared with two subsequent measures of literacy knowledge collected from the same group of teachers. By comparing within-subject scores over time, as opposed to comparing the scores of two or three different groups of participants, the researcher was able to control the level of variability from one measure to the next (Keppel & Wickens, 2004 p. 369). While it was not possible to eliminate or level all potentially confounding variables such as experience, qualifications, motivation and practice effect, the intra-subject variations were potentially less in this design than in the standard repeated ANOVA design in which subjects are nested within different groups (Park, Cho, & Seok, 2009). Any attempt to minimize errors increases power (Keppel & Wickens, 2004).

Research Focus

This quantitative study was designed to measure teachers' literacy knowledge over time to determine the impact of training. To gather the data, the researcher delivered two forms of professional development to one group consisting of all 48 participants. During week one of the intervention, all participants gathered in a central location for an estimated 2 ½ hours per day, for five days. This initial training was followed by monitoring and support at the school level for an additional five weeks. The entire process started with a pretest, followed by the administration of the same test at the end of week one. The final test was administered at the end of the six

weeks. The study also investigated features of professional development that seem to support teachers' learning. Furthermore, the research investigated whether teachers' years of experience or level of qualification influenced their knowledge of literacy content as reflected by teachers self reported data on the Literacy Instruction Knowledge Survey (LIKS).

The purpose of this study was to evaluate the impact of professional development on teachers' literacy content knowledge by measuring their level of the content at three different time periods during the training. By using two different modes of training – centralized/traditional and school based - the researcher attempted to determine if changes in the features of the training had a significant impact on teachers' performance. The focus was to determine if school based training with coaching had a greater impact on teachers' knowledge level. Collecting data repeatedly from the same group allowed the researcher to compare the means for the three different data sets to determine if there were any statistically significant differences in the means. Given that participants had varying levels of teaching experience and qualification, the research also investigated whether either years of experience or qualification influenced teachers' performance scores on the knowledge survey. The following research questions guided the studied:

Research Question 1

Were there differences in the means of teachers' literacy content knowledge scores as measured by LIKS administered at three different time periods during the study?

Research Question 2

Were teachers' performance scores in any one area of literacy content significantly higher than in the other areas?

Research Questions 3

Did teachers' years of experience influence their literacy knowledge scores during training as reflected by their performance on the LIKS?

Research question 4

Did teachers' level of qualification influence their literacy knowledge scores during training as reflected by their performance on LIKS?

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Instrument

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The LIKS was used to measure teachers' knowledge of the content needed to teach early literacy effectively. LIKS was developed by Utah State University, Brigham University and the University of Utah through a four year research program designed to construct a valid and reliable measure to determine teachers' literacy content knowledge and pedagogical skills (Reutzel, R., Dole, J., Studweeks, R., Fawson, P., Read, S., Smith, J., Donaldson, B. Jones, C., & Herman, K., 2007). To test reliability, the researchers piloted the instrument across nine school districts in the United States of America and ran the Cronbach's alpha test. The overall result for Cronbach's test was .816 (Reutzel et al., 2007).

The instrument consists of 97 multiple choice items. The items cover the following literacy content: decoding, including questions to assess understanding of fluency and high frequency words, comprehension and vocabulary, and writing. There are 32 questions in the section on decoding; 43 items in the comprehension and vocabulary section and 22 items in the writing section. The instrument surveys teachers' understanding of both the content they are expected to teach to develop young children's literacy skills and the methodology that best facilitates students' mastery of content in each area. For example, teachers are asked to demonstrate their understanding of phonemic awareness by indicating which of the following:

(a) segmenting phonemes, (b) clapping the number of phonemes, (c) changing the initial speech

sound from /b/ to /c/ in the word bat, and (d) construct a new word by combining pl with ay, is

an example of manipulating phonemes. Similarly, in the area of comprehension and writing,

teachers are asked to respond to items that require them to identify materials and strategies that

are most effective in meeting instructional needs of students. Teachers determine their responses

base on their evaluation of samples of students' performance in reading and writing. On

November 11, 2010, the researcher signed the nondisclosure agreement form (Appendix A)

seeking permission to use the LIKS instrument.

For the purpose of this research, an additional section was developed and included as

section one of the survey instrument to gather demographic data using variables such as sex,

location of school, school type, years of experience and qualifications. The survey also sought to

find out how often a school was supervised by the Ministry of Education, and how often teachers

met as a staff in their respective schools to discuss literacy and strategies for improvement.

Procedure

In compliance with Institutional Review Board protocol, the researcher first requested

and was granted approval on February 22, 2011 to conduct this research with human subjects

(Appendix B). With permission from the district education manager (Appendix C) the

researcher invited all twelve principals within the district town to a meeting. Eight principals

responded to the invitation and attended the orientation meeting.

The purpose of the meeting was twofold. Firstly, the researcher explained the research

project to the principals and established that the researcher was also the trainer with

responsibility to develop and execute the program. With a background in literacy and teacher

training, the researcher was the best person to conduct the intervention. To minimize bias, the

researcher deliberately conducted the research in a district other than the one in which she lives and works. In so doing, the researcher reduced the chances of working with teachers and principals that she had contact with prior to the research.

Secondly, principals were invited to be a part of the research. All principals present, representing eight schools, volunteered to be a part of the project. The research was limited to only those schools that accepted the invitation to be involved. Secondly, the researcher took the opportunity to get the principals' permission to work with their teachers. Permission from principals facilitated the training planned for teachers. During the meeting the researcher got principals' input on a convenient time to conduct the centralized training for teachers given that teachers would need time to attend the centralized sessions. Principals agreed to make allowances to facilitate the training by allowing teachers to leave their respective sites at 2:15 in the afternoons to get to the location for the training that was conducted from 2:30 to 5:00 during the first week of the intervention.

Training was delivered in two consecutive phases. During the first phase of the program that took place in week 1, teachers received 10 hours of centralized training over five consecutive days. The second phase differed from phase one in that the training took place on site in each respective school through the visits of a coach to individual schools. These visits afforded teachers additional training and support within the context of each school and classroom to reinforce and expand on the content presented in week one (Appendix E). This second of training phase was extended over a five-week period.

Centralized Training-Phase I

The intervention commenced on Monday, April 4, 2011 with an orientation to the study and an overview of the key components of early literacy. This was followed with the

administration of the LIKS. The purpose of this activity was to collect baseline data on teachers' knowledge of literacy content and instructional strategies. Some teachers took up to ninety minutes to complete the LIKS on that first day.

Commencing on Tuesday through Friday of that week, participants met with the researcher each afternoon at the District Education Center for two and a half hours of training. The topics covered in the training were based on best practices in literacy designed to develop teachers' knowledge of the components of early literacy. These key components are consistent with the National Institute of Literacy (Early Literacy Panel Report, 2009) recommended skill areas: phonological awareness, alphabetic knowledge, phonics, oral language, fluency, narrative skills and motivation to read. Appendix E is a detailed outline of the topics covered during the first phase of training. Methodology employed in phase I of the training included presentation of the content, analysis of lesson plans and sample of students' work to elicit content. Teachers were also encouraged to engage in small group discussions to generated specific examples of content and teaching strategies. To provide support, teachers received handouts and journal articles for additional reading. On the Friday, April 8, 2011, the last day of the centralized training, the 48 teachers present were once again asked to complete the LIKS. This time round, most of the teachers completed the survey in one hour, although they had up to 90 minutes.

School Based Training Incorporating Coaching-Phase II

After the initial one week training, the intervention moved into the second phase. This second phase of the program was focused on (a) providing ongoing support, feedback and additional training when and where necessary to clarify and strengthen areas of weaknesses based on observation of teachers' practice, (b) working with teachers as a staff, as oppose to individually, and (c) promoting a culture of learning among teachers by encouraging teachers to

come together weekly or biweekly to share ideas, challenges and to support each other. The researcher and one additional trained literacy coach facilitated this process.

In this phase, teachers were observed and coached at the classroom level to support and encourage the implementation of the content and strategies acquired during the initial training as a means of developing a better understanding of the content. Each school was visited three times during the intervention for an estimated four hours. During the first three hours of the morning session, the coach visited classrooms to observe the language arts block and conference with individual teachers mainly to respond to teachers' questions, reinforce and clarify the content that they were teaching. Prior to the actual observation, the coach engaged the teacher in a discussion to determine what activities the class was involved in. This discussion helped to clarify the specific content or skills students were expected to learn in respect to the objective of the lesson. It also gave teachers an opportunity to articulate the content and explain why certain activities were beneficial to the development of the lesson. There was also a follow-up discussion after each observation to help teachers clarify content, if necessary and for the coach to understand teachers thought processes behind what they were doing. The post conference also afforded the opportunity for the discussion of other strategies that best facilitated students' learning in the particular area.

These visits also indicated gaps that needed further training and support. For example, writing was an area in which teachers needed more on the job training with. Even though, they were introduced to a model of how to teach the writing process using writers' workshop, and went through two mini lessons, they had concerns about the application in the classroom. One of the main concerns was the amount of time needed to teach writing and how to cope with those who seemed reluctant to write. Teachers found it challenging to teach students how to revise and

edit their own writing by modeling these processes and finding writing time for students to get the practice needed.

After classes in the afternoon the coach met collectively with teachers within each respective school. The purpose of the after school meetings was to build the capacity of teachers at the school level to support each other during this professional journey. Teachers were encouraged to share success stories based on what they implemented, samples of lesson plans and teaching aids that supported the delivery of the content. The collaborative meetings gave teachers time to reflect on what they were learning and how they were applying this knowledge to their practice.

Through these school visits, each school received additional contact time with the coach over the five-week period. These visits were scheduled to help teachers better understand the content that they were expected to teach their students during literacy instruction. During the school visits, coaches facilitated ongoing professional development by responding to teachers' queries, creativity and initiatives, and obvious misconceptions.

Figure 1

Breakdown of Intervention Program

Survey/Test participants	Conduct whole group Training in a Central Location	Survey/Test participants

Phase I of Intervention

School-Based Intervention	Survey/Test Participants

Phase II of Intervention
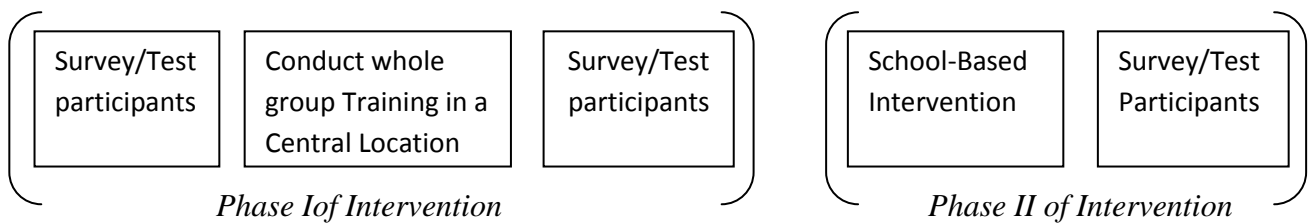
Data Collection

Data were collected at three different time periods during the study to determine the impact of professional development over time on teachers' literacy content knowledge. Through

this process, the researcher collected categorical data relating to teachers' experience and qualification and quantitative data reflecting teachers' content knowledge.

Quantitative data were collected using the LIKS instrument. The first administration was on Monday of week one of the intervention (April 4, 2011). All teachers who attended the first day of training that was held in a central location were asked to complete the LIKS. Using self-reporting, participants individually responded to the administration of the instrument within a 90 minute period. On Friday of that same week, after the first phase of the intervention, participants were once again asked to complete the LIKS instrument. The last administration of the test came five weeks later at which point the researcher asked the participants to fill in the last three questions in the demographic section once again. These questions sought information on the occurrence of collaborative meetings, supervision of schools by ministry officials and the extent to which the coaches visited the school to offer support. Collecting categorical data on this section a second time facilitated the comparison of items such as the frequency of collaborative meetings at the school level and coaching.

At the end of the last administration, the researcher collected 48 questionnaires. A total of 13 participants had withdrawn from the study during the six weeks period. The data collected from these 48 participants who completed all three rounds of the test administration were the only data sets that were analyzed and interpreted to determine the results reported. Incomplete data sets were eliminated. For each administration of the survey, teachers were required to come to the District Education Center. All the testing was done in the same room at approximately the same time of day.

Data Analysis

Participants received one point for each correct response out of a possible total of 97 on the LIKS. Repeated measures within subjects design was used to compare means to determine if there were statistically significant differences in teachers' performance as reflected by the three different scores collected. Using Microsoft Excel and SPSS 17, the researcher used descriptive and inferential statistics to compare the means for the three measures taken–pretest, posttest 1 and posttest 2-over a six weeks period. These results were used to determine if there were statistically significant differences in the means indicating the effect of the independent variable on teachers' performance during phase I and phase II of the intervention.

Similarly, the cumulative score for each participant in each of the three areas tested - decoding/fluency, vocabulary/comprehension and writing - by the LIKS were calculated to determine the overall mean for each section. The means were compared using One-Way ANOVA to determine if teachers did significantly better in one of the areas. Where there were differences in the means, post-hoc analyses were conducted to determine if these differences were statistically significant.

To answer questions 3 and 4, the researcher first calculated the sum of the mean difference between posttest 1 and pretest. This new variable was used to determine if experience and qualification influenced teachers' performance during the first phase of the training. The next step was to calculate the mean difference between posttest 2 and posttest 1. Similarly, the new variable was used to determine if experience and qualification influenced teachers' performance scores during the second part of the training.

In so doing, the researcher was able to determine if teachers' years of experience or level of qualification had a significant effect on their performance scores. One-Way ANOVA was

used to compare the means of the groups and to measure the effect of the different levels of independent variables on the dependent variables. The *F* distribution was used to calculate the critical value at .05 level of probability.

Limitations of Study Design

There were several limitations with the design and execution of this study. First, the data for this research were collected from a convenience sample. Convenience sampling has minimized the control that ensures the sample is representative of the population. Second, the small sample size may have limitations. The third limitation is that measures collected from the same group over time can affect the assumption that each measure is independent of each other due to practice effect (Keppel & Wickens, 2004). In using repeated measures, there was the possibility of variability within the testing environment. Although efforts were made to ensure that the test conditions were similar–same room and same time of day, the simple fact that it was done at three different time periods may have introduced other variables that affected teachers' performance outside of the treatment (Keppel & Wickens, 2004). Finally, the fact that the researcher was also the trainer may have introduced some bias related to the training and the execution of the program. Cognizant of these limitations, the researcher carefully implemented and analyzed the data to alleviate errors.

Summary

Chapter three outlines the methodology with reference to procedures, sample, instruments, data collection and analyses. The study used a knowledge survey to measure changes in teachers' literacy content. In so doing the study attempted to determine the impact of professional development on teachers' literacy content. Measures were collected repeatedly and the means were compared using descriptive and One-Way ANOVA within subjects analysis of

variance to determine if there were statistically significant differences in teachers' performance

on the knowledge survey. The data were also examined to determine if teachers' years of

experience and qualification influenced their performance scores.

CHAPTER IV

FINDINGS

This chapter presents the research findings along with the statistical analyses. Text, tables and graphs are used to present the descriptive data and statistical summaries. The first section presents an overview of the research focus, along with the demographic data collected on participants using the LIKS. The second section presents an analysis of the data to answer the research questions using both descriptive and inferential statistics to interpret the data.

To answer the specific research questions, this study surveyed teachers' literacy knowledge during a six weeks intervention program to determine the impact of training on teachers' understanding of the content surveyed. Furthermore, the research investigated whether teachers with more years of experience or a higher level of qualification had more content knowledge as measured by the pretest and posttest two. Content knowledge was measured in the following three areas:

- decoding and fluency;

- vocabulary and comprehension; and

- writing.

The following four null hypotheses were used to guide the testing of the research questions:

1. $H_{01:}$ There was no significant difference between the means of teachers' literacy content knowledge scores as measured by LIKS administered at three different time periods during the study. The independent variable was the time when the test was administered

and the dependent variables were teachers' overall scores on each round of administration.

2. $H_{02:}$ There was no significant difference between the means of teachers' performance scores in any of the areas of literacy content tested. The independent variables were the areas of content tested (a) decoding and fluency (b) vocabulary and comprehension and (c) writing and the dependent variables were the overall scores for each section tested.

3. $H_{03:}$ There was no significant difference between the means of teachers' literacy content knowledge scores grouped by teachers' years of experience. Five categories were examined:

- 0-5 years,

- 6-10 years,

- 11-15 years,

- 15-20 years and

- 20 plus years.

The independent variables were teachers' experience and the dependent variables were teachers' scores.

H_{04}: There was no significant difference between the means for teachers' literacy content knowledge scores grouped by level of qualification. The following levels of qualification were used:

- no formal training;

- associate degree and

- bachelor's or higher degree.

The independent variables were levels of qualification and the dependent variables were teachers' scores.

Demographic Data

The demographic data revealed that the majority, 45 of the 48 participants were teaching in what are classified as mono-grade schools in Belize, meaning that each teacher within this category was assigned to one grade level per class. The remaining three participants taught in multi-grade schools; that is, they were each responsible for more than one grade level (two or three) in a single classroom. A summary of the demographic data collected for the 48 participants who completed all three rounds of the LIKS is presented in Table 2, along with the selected variables.

Table 2

Demographic Data for Participants

Teacher Characteristics (n=48)	Frequency	%
Sex		
Male	5	10.4
Female	43	89.6
School Location		
Urban	16	33.3
Rural	32	66.7
Management		
Church	4	8.3
Government	44	91.7
Type of School		
Multi-grade	3	6.3
Mono-grade	45	93.7
No. of Teachers per Grade Level		
Infant I (kindergarten)	12	25.0
Infant II (grade 1)	12	25.0

Std. I (grade 2)	10	20.8
Std. II (grade 3)	14	29.2
Experience		
0-5 years	16	33.3
6-10	10	20.8
11-15	6	12.5
16-20	8	16.7
21+	8	16.7
Level of Training		
No formal Training	17	35.4
Associate in Primary Ed.	12	25.0
Bachelor's in Ed. or Higher	19	39.6

When asked how often their school was supervised by the Ministry of Education, the majority or 70% of the respondents reported that supervision of schools was done once per year. When asked if they met as a staff, 75% of the respondents reported on the pretest that they met weekly. These weekly meetings, however, were grade level meetings that were limited in scope. The primary purpose of the meetings prior to the intervention was to ensure that all teachers of a particular grade were teaching the same topics. With the intervention, there was a shift in the schools from the weekly planning meetings to collaborative meetings with teachers across grades levels. These meetings were designed to build a support structure at the school level to nurture a culture of learning among teachers by encouraging them to discuss the content of the literacy program, new concepts or ideas, and teaching strategies and challenges. On the final posttest 30% of the respondent reported that these meetings took place three times over the course of the intervention, while the majority indicated that these meetings were weekly.

Table 3

Descriptive Statistics for Test Scores

Type of Scores	N	Range	Min	Max	Mean	Std. Error of Mean	Std. Deviation	Variance
Pre Section 1 Scores	48	15	5	20	11.1	.473	3.279	10.750
Pre Section 2 Scores	48	15	3	18	11.0	.521	3.609	13.021
Pre Section 3 Scores	48	13	0	13	7.1	.390	2.699	7.287
Overall Pre Scores	48	23	18	41	29.2	.862	5.969	35.627
Post 1 Section 1 Scores	48	21	3	24	12.2	.668	4.625	21.390
Post 1 Section 2 Scores	48	18	4	22	11.8	.583	4.039	16.312
Post 1 Section 3 Scores	48	11	2	13	7.8	.369	2.557	6.539
Overall Post 1 Scores	48	35	17	52	31.8	1.150	7.966	63.461
Post 2 Section 1 Scores	48	19	9	28	17.0	.747	5.178	26.807
Post 2 Section 2 Scores	48	14	8	22	15.1	.609	4.221	17.814
Post 2 Section 3 Scores	48	13	4	17	9.5	.430	2.982	8.893
Overall Post 2 Scores	48	37	25	62	41.6	1.400	9.701	94.106

Table 3 presents the scores out of a possible 97 points along with the range, standard deviation and the overall mean score for each of the three rounds of test administration along with the mean score per section. The overall mean scores for teachers' on each test administered indicated a gradual increase in teachers' knowledge over the duration of the intervention, with the posttest mean at 41.6. Pretest results, for teachers' knowledge scores in the decoding/fluency (section 1) and comprehension/vocabulary (section 2) were about the same. The writing section

appeared to be the most challenging section. Scores for posttest 2 and the final test

administration reflected the same trend.

Results of Research Question 1

Research question 1 asked: Were there differences in the means of teachers' literacy

content knowledge scores as measured by LIKS administered at three different time periods

during the study? The survey was administered:

- the first day of the intervention;

- at the end of the first 12 hours of centralized training (five days into the

  research) and

- after the second level of school based training that was conducted over a

  five-week period. This training incorporated coaching of teachers at the

  classroom level.

Repeated measure ANOVA was used to compare the overall means of scores collected

over three time periods. Given that the sample size was small (< 50 samples), the Shapiro Wilk

test was used to assess normality before ANOVA was calculated. The significant *p* value of the

Shapiro-Wilk Test was greater than 0.05, indicating that the data were normally distributed

(Table 4).

Table 4
Shapiro Wilk Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Overall Pre Scores	.094	48	.200[*]	.975	48	.398
Overall Post 1 Scores	.100	48	.200[*]	.983	48	.699
Overall Post 2 Scores	.088	48	.200[*]	.960	48	.098

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.
Refer to appendix F, G and H for graphic representations of test of normality.

Mauchly's test of Sphericity (Table 4) was used to test homogeneity of variance. Results

indicated that the sphericity assumption was violated (p=.05>018). This was corrected using

Greenhouse Geisser (Table 5).

Table 5

Mauchly's Test of Sphericity[β]

Measure:Time

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	Df	Sig.	Epsilona		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Training Time	.839	8.055	2	.018	.862	.891	.500

The analysis of variance within subjects design (Table 6) with a Greenhouse-Geisser

correction, suggested that the overall mean scores displayed in Table 3 reflected a statistically

significant difference $F (1.723, 80.990) = 55.426, p < .0005$.

Table 6

Tests of Within Subjects Effects

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time						
	Sphercity Assumed	4115.847	2	2057.924	55.426	.000
	Greenhouse-Geisser	4115.847	1.723	2388.506	55.426	.000
	Hunh-Feldt	4115.847	1.783	2308.826	55.426	.000
	Lower- bound	4115.847	1.000	4115.847	55.426	.000
Error(Time						
	Sphercity Assumed	3490.153	94	37.129		
	Greenhouse-Geisser	3490.153	80.990	43.094		
	Hunh-Feldt	3490.153	83.785	41.656		
	Lower- bound	3490.153	47.000	74.259		

Post hoc tests using the Bonferroni correction indicated specific differences (Table 7). The difference between pretest mean and mean based on test scores collected after one week of initial training (29.23 ± 5.969% *vs.* 31.83 ± 7.966%) was statistically significant (*p*=.033). Similarly, there was a significant difference between the mean score as determined by the pretest and mean score taken after six weeks of training that incorporated two levels–one week centralized training, followed by five weeks of coaching at the school level-(29.23 ± 5.969% *vs.* 41.65 ± 9.901%) with *P value* < 0.001) which was also different from the mean based on measures taken after the one week interval and the last five weeks of training (31.83 ± 7.966% *vs.* 41.65 ± 9.901%, respectively) which was statistically significant *P* < 0.001 (Table 7). Pairwise comparison indicated that the mean of posttest 2 was significantly higher than the pretest mean and posttest 1 mean (Table 7).

Table 7

Pairwise Comparison: Performance Scores on Knowledge of Literacy Content

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	2	-2.604[*]	.986	.033	-5.051	-.157
	3	-12.417[*]	1.426	.000	-15.958	-8.876
2	1	2.604[*]	.986	.033	.157	5.051
	3	-9.813[*]	1.279	.000	-12.987	-6.638
3	1	12.417[*]	1.426	.000	8.876	15.958
	2	9.813[*]	1.279	.000	6.638	12.987

Based on estimated marginal means
*. The mean difference is significant at the .05 level.
a. Adjustment for multiple comparisons: Bonferroni.

Results of Research Question 2

Research question 2 investigated the differences in teachers' self-reported scores on the

sub section of the test to determine if they did significantly better in any of the areas, specifically

if they demonstrated stronger content knowledge in one particular area. The specific research

question asked: Were teachers' performance scores in any one area of literacy content

significantly higher than in the other areas? The sub sections of the test and the knowledge areas

investigated were:

- decoding and fluency;

- vocabulary and comprehension and

- writing instruction.

The descriptive statistics indicated that teachers' performance level was about the same

for decoding/fluency and vocabulary/comprehension. Writing was the lowest sub score overall.

The standard deviation for the writing section was also the lowest, indicating that there were

fewer variations in the scores for this area (Table 8).

Table 8

Descriptive Statistics of Scores by Literacy Areas

Content Area					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Decoding/fluency	48	13.451	3.3298	.4806	12.485	14.418	7.3	22.3
Vocab/Compre.	48	12.653	2.8781	.4154	11.818	13.489	6.3	19.7
Writing	48	8.132	2.0397	.2944	7.540	8.725	4.0	12.7
Total	144	11.412	3.6412	.3034	10.813	12.012	4.0	22.3

Test for normality indicated that the dependent variable was approximately normally distributed within each category of the independent variable. Significant value of the Shapiro-Wilk test was greater than 0.05 (Table 9).

Table 9

Shapiro-Wilk Tests for Normality

	Literacy Areas	Kolmogorov-Smirnova			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Knowledge Scores	Decoding/fluency	.079	48	.200	.979	48	.551
	Vocab/Compre.	.093	48	.200	.986	48	.848
	Writing	.068	48	.200	.985	48	.782

The results for the Levene's Test indicated that homogeneity of variance was violated (Table 10).

Table 10

Levene's Test of Equality

Levene Statistic	df1	df2	Sig.
4.71	2	141	0.01

A comparison of the means using ANOVA revealed that there was a statistically significant difference between the means for each of the three literacy areas tested ($p < .001$) (Table 11).

Table 11

ANOVA Summary Table for Literacy Areas

	SS	df	MS	F	Sig.
Between Groups	789.926	2	394.963	50.353	.000
Within Groups	1,105.981	141	7.844		
Total	1,895.906	143			

Note: F (2,141) = 50.353 P = .001

Given that homogeneity of variance was not met (Table 10), Welch's Robust test of equality of means was used to determined if differences were significant (Table 12).

Table 12

Welch's Test of Equality of Means

	Statistic[a]	df1	df2	Sig.
Welch	64.056	2	89.832	.000

a. Asymptotically *F* Distributed

Post-hoc analyses using the Games-Howell Test were used to identify the specific differences. Results (Table 13) indicated that there was a statistically significant difference between the mean scores for decoding/fluency and writing (p < 0.001). Similarly, there was a statistically significant difference between the mean scores for vocabulary/comprehension and writing (p < 0.001). There was, however, no statistically significant difference between means for decoding/fluency and comprehension (p=0.423). The conclusion drawn based on the data was that teachers' performance in writing was significantly different from their performance in the other two areas tested (Table 13).

Table 13

Multiple Comparisons Games- Howell Post Hoc Test

(I)Content Area	(J) Content Area	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Lower Bound	95% Confidence Upper Bound
Decoding/fluency	Comprehension	.7981	.6353	.423	-.715	2.311
	Writing	5.3192*	.5636	.000	3.972	6.666
Comprehension	Decoding	-.7981	.6353	.423	-2.311	.715
	Writing	4.5210*	.5092	.000	3.306	5.736
Writing	Decoding	-5.3192*	.5636	.000	-6.666	-3.972
	Comprehension	-4.5210*	.5092	.000	-5.736	-3.306

*The mean differences is significant at the .005 level.

Did teachers' years of experience influence their performance during training as reflected on the LIKS? Teachers were categorized into five levels of experience:

- 0-5 years

- 6-10 years

- 11-15 years

- 15-20 years

- 20+years.

Analysis of data for this question was done in two parts. In part one, the sum of the mean difference between posttest 1 and pretest was calculated. This new variable was used to determine if experience influenced teachers' performance during the first phase of training as reflected by their responses on the LIKS.

Results indicated that the two groups with the most years of experience, 16-20, and 21 plus years respectively got the greatest benefit from the training (Table 14).

Table 14

Comparison of Mean difference Between Posttest 1 and Pretest and Teacher Experience

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Mini	Maxi
Experience					Lower Bound	Upper Bound		
0-5 years	16	2.5625	6.21792	1.55448	-.7508	5.8758	-10.00	12.00
6-10 years	10	2.6000	6.44981	2.03961	-2.0139	7.2139	-5.00	12.00
11-15 years	6	-.3333	9.77070	3.98887	-10.5871	9.9204	-16.00	11.00
16-20 years	8	3.2500	8.03119	2.83945	-3.4642	9.9642	-7.00	19.00
21+ years	8	4.2500	5.75078	2.03321	-.5578	9.0578	-5.00	14.00
Total	48	2.6042	6.82841	.98560	.6214	4.5869	-16.00	19.00

One-way ANOVA was used to conduct further analysis to determine whether the differences in means across the five levels of experience were statistically significant. In using ANOVA, normality and homogeneity of variance were determined. The significant p value of Shapiro-Wilk Test of normality was greater than the alpha at .05, meaning that the scores for mean difference were normally distributed across the groups (Table 15).

Table 15

Test of Normality for Difference Between Pretest and Posttest 1

Teacher Experience	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
0-5 years	0.216	16	0.044	0.938	16	0.331
6-10 years	0.212	10	.200*	0.896	10	0.200
11-15 years	0.18	6	.200*	0.957	6	0.800
16-20 years	0.241	8	0.191	0.896	8	0.264
21+ years	0.164	8	.200*	0.978	8	0.95

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.

Homogeneity of variance was met based on Levene's Test results. The Sig. value was > .05 (Table 16).

Table 16

Test of Homogeneity of Variances for Difference Between Posttest 1 and Pretest

Levene Statistic	df1	df2	Sig.
.505	4	43	.732

A comparison of scores for mean difference between posttest 1 and pretest across the five groups of teachers suggested that there was no statistically significant difference among the performance of the groups based on the first phase of the intervention (Table 17). While there

were observed differences in the means based on Table 14, further analysis indicated that these differences were not statistically significant (Table 17).

Table 17

ANOVA Summary Table for Mean Difference Between Pre-Test and Posttest 1

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	76.808	4	19.202	.390	.814
Within Groups	2114.671	43	49.178		
Total	2191.479	47			

Part two of the analysis examined whether teachers' experience influenced their performance during phase II training. The overall mean difference between posttest 2 and posttest 1 was calculated to determine if there were differences in the mean scores as reflected by teachers' performance on the LIKS at the end of phase II training.

Based on the descriptive statistics (Table 18) the mean suggested that teachers within the group of 16-20 years experience had higher gain scores than their counterparts in other groups. The standard deviation for this group also indicated more variation in their scores. Based on the overall difference between means for posttest 2 and posttest 1, the performance of teachers with the least years of experience was similar to that of teachers with the highest years of experience (Table 18).

Table 18

Descriptive Statistic for Mean Difference Between Posttest 2 and Posttest 1by Experience

					95% Confidence Interval for Mean			
N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Mini	Maxi
16	8.75	9.5184	2.3796	3.678	13.822	-7	23

0-5 yrs.								
6-10 yrs.	10	9.8	10.37947	3.28228	2.375	17.225	-12	23
11-15 yrs.	6	11.833	5.84523	2.3863	5.6991	17.9675	5	21
16-20 yrs.	8	12.125	9.04651	3.19842	4.5619	19.6881	-3	25
21+ yrs.	8	8.125	8.52622	3.01447	0.9969	15.2531	-7	20
Total	48	9.8125	8.8598	1.2788	7.2399	12.3851	-12	25

Result of the Shapiro-Wilk Test indicated that the scores were normally distributed (Table 19).

Table 19

Shapiro-Wilk Test of Normality for Differences Between Posttest 2 and Posttest 1

	Tests of Normality					
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
	0.075	48	.200*	0.973	48	0.335

a. Lilliefors Significance Correction
*. This is a lower bound of the true significance.

Levene's Statistic indicated that the variances between the groups were equal (Table 20).

Table 20

Levene's Statistic Difference Between Posttest 2 and Posttest 1

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
0.512	4	43	0.727

ANOVA results for the mean difference between posttest 2 and posttest 1 scores were not statistically significant across the five levels of teacher experience (Table 21). Teachers' years of experience did not influence their average gain scores during phase II training as reflected by the mean difference between the posttest 2 and posttest 1.

Table 21

ANOVA Summary Table for Mean Difference Between Posttest 2 and Posttest 1

	SS	df	MS	F	Sig.
Between Groups	108.129	4	27.032	.325	.860
Within Groups	3581.183	43	83.283		
Total	3689.313	47			

Results of Research Question 4

Did teachers' level of qualification influence their performance during training as reflected on the knowledge survey? The levels of training were:

- No formal training;

- Associate in Primary Education and

- Bachelor's in Education/Trained Teacher's Diploma or higher.

To measure teachers' performance based on the two levels of professional development they experienced during the intervention, the mean differences were calculated separately. First, the mean differences between posttest 1 and pretest scores were compared for the three levels of training. Similarly, the mean difference of posttest 2 and posttest 1 scores were compared for the three levels of training. In comparing the overall mean differences between posttest 1 and pretest, descriptive statistics indicated that the group with the highest level of training had the lowest mean (Table 22).

Table 22

Descriptive Statistics for Difference Between Posttest One and Pretest by Qualifications

	N	M	S D	Std. Error	95% Confidence Interval for Mean		Mini	Maxi
					Lower Bound	Upper Bound		
No Formal Training	17	3.647	6.585	1.597	0.261	7.033	-6	12

*APE	12	3.583	6.881	1.986	-0.789	7.955	-10	14
**BED								
***TTD								
or Higher	19	1.052	7.074	1.623	-2.357	4.462	-16	19
Total	48	2.604	6.828	0.985	0.621	4.586	-16	19

*Associate in Primary Education
** Bachelors in Education
*** Trained Teachers' Diploma

Test of normality indicated that scores were normally distributed across the levels of

qualification (Table 23).

Table 23

Shapiro-Wilk Test of Normality for Differences Between the Mean for Posttest 1 and Pretest

	Kolmogorov-Smirnova			Shapiro-Wilk		
Teacher Training Level	Statistic	df	Sig.	Statistic	Df	Sig.
No Formal Training	0.172	17	0.196	0.891	17	0.048
Associate in Primary Education	0.216	12	0.127	0.909	12	0.207
Bachelor's in Education/Trained Teacher's Diploma or Higher	0.183	19	0.093	0.92	19	0.114

a. Lilliefors Significance Correction

Homogeneity of variance was met with a significant value greater than .05 (Table 24).

Table 24

Levene's Test of Homogeneity of Variance for Difference Between the Mean for Posttest I and Pretest

Test of Homogeneity of Variances			
Levene Statistic	df1	df2	Sig.
0.309	2	45	0.736

A comparison of the overall mean difference of posttest 1 and pretest within the three

levels of teacher qualification indicated that there was no statistically significant difference

between the means (Table 25). Teachers' level of qualification did not influence their

performance during the phase I of the training.

Table 25

ANOVA Summary Table for Differences Between Pretest and Posttest One

	SS	Df	MS	F	Sig.
Between Groups	75.733	2	37.866	0.805	0.453
Within Groups	2115.746	45	47.017		
Total	2191.479	47			

Further analysis was conducted to determine if there was a difference in teachers'

performance during the second phase of training based on their qualifications. To answer this

part of the question, a new variable was created by finding the mean difference between posttest

2 and posttest 1. This variable was used to determine if teachers' qualification influenced their

performance during the second level of training.

Descriptive statistics indicated that the mean difference for the teachers with no formal

qualification was slightly higher than the mean difference for teachers with an associate degree

in teaching and those with Bachelor' degree or higher (Table 26). The standard deviation

indicated that the scores for the group with no formal training were closer to the mean than the

scores for the other two groups.

Table 26

Comparison of Mean Difference Between Posttest 2 and Posttest 1 and Teachers' levels of Qualification

	N	M	SD	Std. Error	95% Confidence Interval for Mean		Min	Maxi
					Lower Bound	Upper Bound		
No Formal Training	17	11.17	7.788	1.888	7.172	15.180	-1.00	23.00
*APE	12	9.750	9.323	2.691	3.826	15.674	-6.00	22.00
BE/*TT or Higher	19	8.631	9.730	2.232	3.941	13.321	-12.00	25.00
Total	48	9.812	8.859	1.278	7.239	12.385	-12.00	25.00

*Associate in Primary Education
** Bachelors in Education

*** Trained Teachers' Diploma

Shapiro-Wilk Test indicated that the dependent variable was normally distributed across the three levels of teacher qualification (Table 27).

Table 27

Shapiro-Wilk Test of Normality of Variance for the Mean Difference Between Posttest 2 and Posttest 1

		Kolmogorov-Smirnova			Shapiro-Wilk		
Teacher Training Level	Statistic	Df	Sig.	Statistic	Df	Sig.
No Formal Training	0.139	17	.200*	0.942	17	0.346
Associate in Primary Education	0.115	12	.200*	0.949	12	0.625
Bachelor's in Education/Trained Teacher's Diploma or Higher	0.183	19	0.094	0.931	19	0.18

a. Lilliefors Significance
Correction
*. This is a lower bound of the
true significance.

The results of the Levene's Test indicated that homogeneity of variance was met (Table 28).

Table 28

Levene's Test of Homogeneity of Variances for Differences Between Posttest One and Posttest Two

Levene Statistic	df1	df2	Sig.
.126	2	45	.882

One-Way ANOVA was used to compare the overall mean difference between posttest 2 and posttest 1 to determine if teachers' qualifications influenced their performance during the

phase II training. The results indicated that the differences in the means were not statistically significant (Table 29).

Table 29

ANOVA Summuary Table for Differences Between Posttest 1 and Posttest 2

	SS	df	MS	F	Sig.
Between Groups	58.171	2	29.085	.360	.699
Within Groups	3631.142	45	80.692		
Total	3689.313	47			

Summary

The results indicated changes in teachers' knowledge level. Comparison of mean scores revealed that the differences between pretest scores and posttest 1scores were statistically significant. Similarly, there were statistically significant differences between the means for the posttest 1 and posttest 2. Teachers' performance scores also indicated significant differences in the overall mean scores for the different sections of the LIKS survey.

Several analyses were conducted to determine whether teachers' level of qualification had an impact on their performance during the intervention. Results from ANOVA comparison of scores representing the overall mean difference between the post one and pretest showed that qualification did not have a significant effect on teachers' performance during the phase one of training. Similarly, a comparison of overall mean difference between post two and posttest one within the three levels of qualification indicated that there was no statistically significant difference between the means. A comparison of the overall mean of all three measures of teachers' scores also indicated that qualification did not influence teachers' performance. The results of analyses using linear regression were consistent with these findings.

CHAPTER V

CONCLUSION, DISCUSSION AND RECOMMENDATIONS

CONCLUSION

The literature review presents scientific evidence to validate the claim that effective professional development influences teachers' practice and students' achievement (Desimone, 2009; Garet, Porter, Desimone, Birman, & Yoon, 2001; Murchan, Loxley & Johnston, 2009). The focus of these studies has mainly been in the area of mathematics and science (Corenti, 2007) with the majority of them conducted in developed countries. In the area of literacy, Corenti (2007) asserted that much of the earlier works focused on outlining characteristics of effective teachers, rather than determining how to enhance the effectiveness of all literacy teachers. To maximize professional development efforts in Belize, this study was designed to investigate the impact of professional development on teachers' understanding of literacy content. In so doing, the study attempted to examine features of professional development that contribute to effective professional development. Knowledge of content is a strong indicator of effective teachers (Dickenson & Brady, 2006). A lack of a clear understanding of how teachers learn and what features of professional development have the greatest impact on teachers' learning hinders the planning of effective programs.

This study incorporated two forms of professional development. During week one of the intervention, teachers were exposed to 10 hours of professional development through the traditional workshop style conducted in a centralized location. This initial training was followed by monitoring and support at the school level over a five week period. The entire process started with a pretest, followed by the administration of the same test at the end of the first phase, one week into the research and at the end of the program, five weeks later. Data collected allowed

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for the evaluation of teachers content knowledge before and after each phase of the intervention. In so doing, this research has provided a model for the evaluation of the impact of professional development on teachers' understanding of literacy content. Guskey, 2000 contends that in planning interventions for teachers, the focus should be on what teachers will learn, rather than on the activities. Collecting data from teachers on their knowledge of literacy content before, during, and after the intervention provided valuable information on what teachers learned and areas for further training.

The following four null hypotheses emerging out of the research questions were tested. H_{01}: There was no significant difference between the means of teachers' literacy content knowledge scores as measured by LIKS administered at three different time periods during the study. The data analysis rejected this null hypothesis. Post hoc analyses revealed that statistically significant differences existed between teachers' pretest scores and scores collected at the end of first week of training (Table 7). Similarly, there were statistically significant differences between the means for the posttest one and posttest two (Table 7). These results support the claim that professional development with a focus on the acquisition of literacy content has the potential to increase teachers' knowledge level (Doppelt et al., 2009). The results indicated that both levels of training contributed to the development of participants' knowledge of literacy content. There was a gradual increase in teachers' content knowledge from phase I of the intervention through the end of phase II training. During phase I, the centralized training showed a modest increase in teachers' knowledge level. Phase II, school based training supported by coaching and collaborative meetings over a five-week period showed a greater increase in teachers' knowledge of the content surveyed.

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H_{02}: There was no significant difference between the means of teachers' performance in any of the areas of literacy content tested. Descriptive data indicated that teachers' performance was about the same in the area of decoding/fluency and vocabulary/comprehension. The mean scores for writing, however, indicated that the results were lower (Table 8). Further analysis indicated that this difference was statistically significant (Table 11).

H_{03}: There was no significant difference between the means of teachers' literacy content knowledge scores grouped by teachers' years of experience - 0-5 years, 6-10 years, 11-15 years, 15-20 years and those who taught for over 20 years. The analysis indicated that there was no statistically significant difference in teachers' performance based on their years of experience (Tables 17 & 21). This null hypothesis was therefore not rejected. Teachers' experience did not influence their performance on the LIKS.

H_{04}: There was no significant difference between the means of teachers' literacy content knowledge scores grouped by teachers' level of qualification, those with either no formal training, those with associate degree or those with a bachelor's or higher degree. Based on the data analysis, this null hypothesis was not rejected (Tables 25 & 29). Teachers' qualification did not influence their performance on the LIKS.

Discussion for Research Question 1

The results of the pretest data corroborate the need for professional development aimed at improving teachers' understanding of literacy content. The overall mean score for the pretest was 29.2 out of a possible 97 points (Table 3). This indicated that at the start of the intervention, participants knew an estimated 30% of the content tested on the survey instrument. This low score signals the need for teacher support that is geared toward improving their knowledge of the content they are required to teach through the language arts curriculum.

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Teachers' low performance on the pre survey can be attributed to several factors. First, 35.4% of the participants are teaching with absolutely no teacher training. Literacy instruction is complex and requires technical expertise. This situation is compounded by the fact that Belizean students are learning English as a second language, while simultaneously developing literacy skills in the target language. As a result, teachers' expertise must also include pedagogical knowledge that incorporates an understanding of how children best learn the specific content or skill. This knowledge is critical for the effective delivery of the curriculum (Borko, 2004).

The results of this intervention program indicated that both the traditional workshop model and reform type professional development programs added value to teachers' content knowledge. This is consistent with the research. While the traditional workshop style of training has the potential to increase teachers' knowledge as demonstrated in this study, there are some limitations. Traditional or centralized training does not always address individual needs of teachers (Alber & Nelson, 2002). Pradere (2007) indicated that the main reason for this is the time factor. With limited time, the traditional workshop model may not adequately address the individual needs of teachers based on background experiences and school contexts. As a result, the transfer of knowledge from workshop setting to classroom practice is often low.

In reference to question 1, post hoc tests results indicated specific differences in the results based on when the data was collected (Table 7). The differences in the scores between pretest and posttest 1 and between posttest 2 and posttest 1 indicated that training contributed to the change in participants' content knowledge as reflected by LIKS. According to Borko (2004), teachers' content knowledge increases when professional development programs focus explicitly on one subject area and best practices to facilitate students' learning of the content. The posttest 1 scores indicated a modest increase in knowledge at the end of one week of training. Extended

over an additional five weeks with the support of a coach at the school level, the second phase of training revealed an even larger increase in scores as demonstrated by the posttest 2 results. Based on these results, the researcher concluded that the additional five weeks of intervention contributed to this increase in scores.

While the evidence supports professional development initiative that is extended over a period of time as a critical feature, it is not just the time factor that makes the difference. To bring about change in teachers' knowledge, professional development has to go beyond the time factor. First, it must focus on content. Second, it must incorporate coaching and the way teachers learn and develop new skills (Darling-Hammond & Richardson; Neuman and Wright, 2010). More time allows for more flexibility in terms of the methodology used and the extent to which context can be incorporated into the training.

It was, for example, far more feasible to infuse elements of adult or experiential learning into the phase II training that extended over five weeks than during the one week period at the beginning. During the second phase of training, the participants were learning more about the content through application and evaluation of what was working and what was not. This reflective approach required participants to be actively engaged; the content and activities were classroom based, practical and in alignment with teachers' immediate work experience. Incorporating classroom practice in professional development enhances teachers learning and increases the chances of teachers incorporating and sustaining the initiatives. Garet et al. (2001) found that teachers learn more when professional development programs are connected to school goals and their everyday work. Penuel, et al. (2007) concurred, stating that teachers themselves recognized the benefits of professional development that was extended over time. Endorsing this

position, Birman et al., (2000) cited form, duration and participation as critical features of effective professional development.

Classroom observation provided an excellent opportunity for on the job training based on individual needs of teachers. More importantly, it gave the researcher an opportunity to engage participants in dialogue to clarify the content they were teaching and in so doing develop their understanding of the content. Based on a similar study, Neuman and Wright, (2010) concluded that coaching was an effective form of professional development.

Coaching at the school and classroom level facilitated the kinds of support Belizean teachers need to make informed instructional decisions based on students' performance. Through coaching, teachers were encouraged to develop a culture of learning by engaging in collaborative meetings at the respective school level. The meetings were designed to promote and sustain reflective practice among staff members. During the meetings, teachers were able to actively engage in the learning process by tapping into their unique experiences at the school level and by taking on the shared responsibility for the professional development of group members (Borko, 2004; Seago, 2004).

Discussion for Research Question 2

Foundation skills for early literacy development include decoding, fluency, vocabulary, comprehension and writing. To effectively develop students' literacy skills, teachers must have a profound understanding of each of these areas (Borko, 2004). It is equally important for teachers to know what techniques best facilitate students' learning in each area. As cited in the literature, content and pedagogically savvy teachers are in a better position to make informed instructional decisions (Vrasidas & Zembylas, 2004).

The analysis for question two revealed that participants' performed at about the same level in the areas of decoding/fluency and vocabulary/comprehension (Table 8). Based on the data collected, the writing section presented the most challenge for the participants. Even though the results reflected a small but steady improvement in this area, the scores for writing were consistently lower than that of decoding, fluency, vocabulary and comprehension. This indicated that participants' conceptual understanding in this area was extremely weak. It is possible that this lack of knowledge is carried over into the teaching of writing.

While this study did not attempt to link teachers' performance with students' performance as measured by national examinations, there seems to be a striking degree of similarity. National examinations taken by all primary school students at the end of grade four and grade eight consistently revealed that the writing section in the language arts paper appears to be the most challenging for students (Ministry of Education, Statistics, 2009).

Classroom observations also revealed that writing was generally not taught consistently through modeling, guided practice and independent practice. Teachers seem to shy away from writing instruction. In the lower grades, teachers generally felt that students could not write. They were uncomfortable with invented spelling and even drawing as the first stage of writing. For this reason, writing as a process generally not taught. Writing is a difficult skill that needs to be taught explicitly and one that requires consistent practice right across the curriculum.

While participants demonstrated that they were familiar with the writing process, writers' workshop and the teaching of writing through modeling, guided practice and time for lots of practice was an area of weakness. This information was garnered from the teachers' survey and from being on site with teachers. Participants found questions that required them to evaluate samples of students' writing to determine what support was needed to improve teaching and

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learning challenging. Borko (2004) stated that teachers seem to acquire strategies more readily than they are able to make instructional decisions based on students' work. The low scores signaled a general weakness in terms of teachers' understanding of what was required of them to facilitate young children's literacy development.

There were several factors that contributed to teachers' overall low performance. One possible reason has to do with the instrument used. While the content surveyed was consistent with best practices in early literacy (Moats, 2009), many of the items on the questionnaire were introducing the participants to new concepts. Phonological awareness, for example, is still a fairly new concept in Belizean classrooms. It has only been introduced to teachers through professional development sessions, formal training and the school curriculum within the last decade. Unless teachers who have been in the system prior to the last decade accessed some form of professional development in this area, they may have had little or no prior knowledge of this concept.

Despite efforts to educate teachers in this area, phonemic awareness is still not widely taught in many schools. One fundamental reason for this can be attributed to the texts that are currently being used in the early grades. Many of the resources that teachers have access to introduce phonics without the foundation skills for reading that comes from a strong phonological awareness program. In Belize, phonics is the primary method of reading instruction in the early grades.

The teaching of fluency and strategy instruction to facilitate vocabulary development and comprehension are only now being emphasized as part of current practice. Similarly, the introduction of quality children's literature is only now beginning to take root. However, many schools lack access to books and therefore teachers find it difficult to nurture the habit of reading

and to promote comprehension through analysis of story grammar and open discussion based on a wide range of texts.

Additionally, all the items on the LIKS instrument required some element of application, analysis, synthesis or evaluation, making the instrument a good measure of teachers' understanding of what is required of them as literacy instructors. For example, one item required teachers to analyze a student's writing sample to determine appropriate feedback based on kinds of errors the student made. While classroom artifacts and demonstrations were used during the training to facilitate this type of learning, the scope of the content was too much to cover all the areas of early literacy instruction in depth given the time period that was allotted for this research. For teachers who had no prior knowledge and practice with the teaching of writing as presented by this intervention, for example, it was a lot to master.

Given that the objective of the intervention was to determine where teachers were in their understanding of the content needed to teach literacy and the impact of the program in facilitating their learning in this area, the questionnaire surveyed a broad range of topics that were all relevant. Notwithstanding, teachers needed more time to actually work with the content as one means of internalizing the material. Professional development designed to effect change in teachers' knowledge level and practices needs a considerable amount of time. Most of the studies reviewed, for example, were conducted over a long period (Borko, 2004; Morrow & Casey, 2004; Nueman & Cunningham, 2009). According to Borko (2004), meaningful acquisition of knowledge for teachers can be a slow and uncertain process. As a result, the level of impact varies based on attitude and motivation of participants.

Discussion for Research Question 3

While it was expected that experience would be a factor that would influence teachers' performance, the results indicated otherwise. Teachers' experience did not influence their performance on the LIKS. So, why teachers' experience did not influence their performance during the intervention? Adult learning is grounded in experiential learning that posits a close relationship between learning and experience (Gaynell & Ballard, 2010). Building on teachers' experience is a good strategy to advance any type of learning and is recommended. From this viewpoint, this is tantamount to scaffolding learning as defined by Vygotsky's theory of learning. First of all, it takes years to accrue experience in teaching. This often translates into teachers with more experience being older and having an established set of learned behaviors. As a result, it is often more difficult to change their way of thinking or practice. The less experienced participants, on the other hand, often tend to be novice teachers who recognize the fact that they may not have the skills needed and therefore are more open to new ideas.

Given that attendance at the training was voluntary, attitude and motivation to learn new ideas could also be factors that influenced the results for question three. Street (2003) posited that teachers' attitudes about teaching have a strong influence on their learning. Teachers' attitudes are linked to their level of motivation and commitment to certain paradigms. McCoss-Yergian and Krepps (2000) found that negative attitudes of content area teachers toward literacy instruction were highly correlated with the level of implementation of an initiative to improve reading and writing across the board. Teachers who had a negative attitude toward the program were less likely to implement the strategies in the classroom.

It is also interesting to note that participants who dropped out of the intervention while the study was being implemented were for the most part more experienced and had higher levels

of qualification. A number of these teachers were closer to retirement and so may not have considered the investment of their time worthwhile at this stage of their career. Notwithstanding, the descriptive data seem to suggest that teachers with more years of experience are more likely to benefit from this training. With that indication, perhaps a longer period for the intervention would have yielded different results. Morrow and Casey (2004) conducted a study with teachers over two years to corroborate the findings of effective professional development. Initially, teachers were introduced to the best practices over 10 weeks of training in first year. Subsequently, teachers were engaged in goals setting and planning for classroom implementation. The initial phase was deliberately slow, recognizing that change takes time. In the second phase, of year 2, teachers received support from coaches and study groups. One of findings of this study highlights the importance of allowing adequate time for change to occur.

Discussion for Research Question 4

While an estimated 40% of the participants were qualified at the Bachelor's level or above, the results indicated that qualifications did not make a difference in teachers' performance on the LIKS. Teachers with higher levels of qualifications did not perform better than teachers who were unqualified. Given that teacher education programs are designed to equip teachers with the knowledge and skills needed to deliver all aspects of the curriculum, this result was surprising. It was, for example, anticipated that participants with a Bachelor's in Education would have a comprehensive understanding of the literacy content. Based on the results, this was not the case.

This phenomenon could be attributed to several factors. First of all, teachers in the Belizean education system at the primary level are generalists and are trained as such. They are expected to have expert knowledge in all areas of the curriculum. While this is the case, formal

training does not necessarily provide these teachers with comprehensive content in any one area. For example, teachers who accessed the Bachelor's in Education program prior to 2008 took only four courses-Language Arts, Foundations of Literacy Development, Advance TESOL and Children's Literature- in preparation to teach language arts (Ministry of Education, 2000). The 2008 revised course outline revealed that this program of studies went from four courses focusing on language arts/literacy to seven courses. The additional courses included Reading Strategies for Multilingual Classrooms, Fundamentals of Linguistics, Language Methods I and Language Methods II.

The addition of these courses is consistent with the needs of teachers to understand the connection between language and literacy. The linguistic course gives teachers the background they need to effectively teach phonemic awareness. Although phonemic awareness is a significant predicator of reading success (Mathes & Torgesen, 1998), it is not systematically taught in all Belizean classrooms. Teachers who were trained a decade or more ago would not have been exposed to this concept during training. The low scores on the pre survey revealed that many teachers did not understand the concept of manipulating phonemes and consonant blend as opposed to consonant digraph. Similarly, teachers struggled with analyzing words to determine, for example, which of the following: a) cloud b) chip c) strap, and d) bring contains a diphthong.

Teachers who were trained 2008 and after received more content in literacy than their counterparts who were trained prior to 2008. One reason why level of training may not have influenced teachers' performance in this study can be attributed to whether participants were formally trained prior to 2008 or after. The results highlighted the fact that regardless of formal training, teachers need ongoing professional support to effectively deliver the language arts

program which incorporates literacy instruction. Training high quality teachers is still a challenge (Neuman & Cunningham, 2009; Snow, Griffin, & Burns, 2002).

Even with a master's degree teachers may not be fully prepared for the complex job of teaching. Teachers with master's degree in the Belizean system at the primary level are an exception rather than the rule. Additionally, teachers with master's degree at the primary level more than likely have pursued studies in leadership or business based on available options to further their education, since Master's degree in primary education with specialization in a particular content area is not presently being offered by the University of Belize.

Significance of the Study

Most of the research on professional development has been done in the area of mathematics and science. Those that were focused on literacy were designed for a different context. Conducted in Belize, this study adds to the body of literature on professional development directed at improving teachers' knowledge of literacy content. It is a useful addition to the limited research conducted in Belize.

Similarly, the literature on teachers' knowledge focuses on the cognitive development of teachers as individuals without recognizing the importance of the social aspect of teachers as adult learners within communities of practice (Poulson, 2001). In highlighting the importance of aligning teacher learning within the context of their schools and practical on the job activities, this study adds to the body of research on the impact of professional development on teachers' learning.

By surveying teachers' knowledge of literacy content, the results have implications for teacher training institutions and managers of schools. This study also highlighted areas of strength and areas that needed improvement. The results indicated a need for further training and

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professional development in literacy. Helping teachers to sharpen their skills in the teaching of writing is, for example, an area that needs critical and immediate attention. This data is exactly the kind of information that the Teacher Developing Services in the Ministry of Education need to facilitate their planning of intervention programs for teachers.

This study provides documented evidence of the characteristics of effective professional development programs that are more likely to sustain changes in teachers understanding of the content and pedagogical skills needed for effective literacy instruction in the early primary grades. While the focus of the study was on evaluating the impact of the program on teachers' knowledge of literacy content, the basic features of effective professional development cited and tested can be applied to professional development in other subject areas. Additionally, the study provides a model for the evaluation of professional development programs. In determining what teachers should learn as a result of the training, a survey of teachers' knowledge at the end of the program is one way of knowing whether program objectives were achieved.

This study can also serve to initiate the dialogue among teacher training institutions in Belize to establish content standards for teachers in the area of literacy. These can be used to measure teachers' level of preparation to teach literacy.

Limitations of the Findings

Teachers of literacy must understand the linguistic elements of language and how they relate to the development of reading and writing skills. In this study, a pretest and posttest model was used to determine the impact of training on teachers' content knowledge in the area of literacy. Knowledge was measured in terms of teachers' understanding of both the content and

strategies related to each area of literacy development. By using convenience sampling, the results are not necessarily representative of the entire population.

Given the scope of the content and the importance of engaging teachers in the learning process embedded in the respective context, time constraint was a limitation. Professional development studies of this nature are best conducted over very long period of time. Time constraint also limited the number of schools visits. School visits were a critical part of the program aimed to put structures in place to support teachers in their respective school environment. It was anticipated that school visits for the purpose of mentoring and coaching would greatly influence changes in teachers' performance.

Conducted over a six week period, the short time between the administration of pretest and posttest one in particular, may have resulted in practice effect. Practice effect can have implications on the results. Cognizant of these limitations, the researcher carefully implemented the program.

Implications for Policy and Practice

The findings of this study provided several ideas that can contribute to the improvement of professional development programs in Belize aimed at improving teachers' content knowledge for effective literacy instruction. As supported by the literature review, duration of the study resulted in increased knowledge in literacy. While teachers' knowledge increased with both levels of training–traditional and reform approach–it is clear that the time factor contributed to the results, indicating that both approaches can be effective when the methodology is consistent with best practices in this area. Professional development over time lends itself to active engagement of teachers and the use of practical ideas.

A whole school effort provides an opportunity for the integration of context and for responding to individual needs at the classroom level. This approach also builds a culture of learning at the school level to support and sustain change. Given that more than 50% of Belizean teachers are untrained, this method of professional development is a viable option to ensure that teachers get the support needed to effectively teach literacy.

Recommendations for the Ministry of Education

Professional development programs that focus on developing teachers' content knowledge in particular subject areas have had great success (Doppelt et al., 2009). Given that content knowledge is necessary for effective instruction (Bean & Morewood, 2007), it is recommended that greater effort be placed on professional development programs geared toward developing teachers' content knowledge in literacy. Licensing of teachers should not be limited to the number of hours spent in professional development sessions, but based on what teachers actually learn in these sessions. Consequently, the evaluation of professional development sessions must incorporate mechanisms to survey their impact on teachers' learning. In so doing, professional development programs are more likely to yield the desired changes in teachers' content knowledge necessary for effective literacy instruction.

Successful efforts to enhance teachers' knowledge and change practices in schools must be sustained. To support these changes, more efforts must be directed at working with whole schools as opposed to individual teachers. The selection of schools for intervention should be tied to school performance indicators based on National Examinations. Using school data to drive improvement is critical and can be one way of tracking improvement as well.

Recommendations for District Managers and District Education Centers

With responsibility for supervision of schools in their locale, district centers must ensure that their efforts to improve schools are evidence based. Evaluating the quality of teaching cannot be limited to classroom observation and one off teaching episodes. Teachers often know when schools are going to be supervised and as a result they prepare extensively for these visits. In so doing, data collected during these visits may not always represent everyday occurrences in these schools.

One way to hold schools accountable for students' learning in the area of literacy is to look at students' performance records for National Examinations. The results of these examinations can point to areas where teachers need training to improve their level of content and understanding of how children learn the particular content. Writing, for example, has been highlighted as an area of weakness for participating schools. Using the data, District Centers can help schools to develop school improvement plans that address, but are not limited to professional development needs of teachers. With such plans, district center can help school to set targets for literacy improvement, starting with better quality literacy instruction.

Recommendations for Principals

Principals play a critical role in school effectiveness. Principals along with literacy coaches can shift the present focus to embrace the responsibility of supporting teachers' professional development, along with each individual teacher. There is a difference between supervision and the evaluation of teachers. School principals have a role to play as instructional leaders. In their capacity as instructional leaders, their supervision role is developmental. The aim is to help teachers improve their understanding of the content they teach as well as helping teachers to hone their skills as literacy instructors.

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Recommendations for Teachers

Teachers are encouraged to develop as reflective practitioners. Attendance at workshop is only one form of professional activity. Taking information from these sections, back into the schools is the best way to fulfill the purpose of these initiatives. It is in the implementation process, that teachers actually learn the most about what works and what does not. Discussing matters related to the teaching of literacy with colleagues can also help to alleviate some of the challenges and is perhaps one of the best ways to ensure ongoing professional development. Use the available data to set goals and strategies for improvement.

Teachers within the staff have strengths and weaknesses. As a result, schools often have the solutions to problems right among the staff. Teachers are, therefore, encouraged to share best practices and activities. This practice builds self confidence, motivation and team effort. Sharing ideas and collectively finding solutions, also builds on weaknesses and creates a positive environment that can be stimulating for both teachers and students.

Recommendations for Future Research

With the present thrust of the Ministry of Education to improve the quality of education in Belize under the present 'Quality School Initiative' evaluating teacher quality is an important part of that process. Any attempt at improving the quality of instruction in our schools has to examine the quality of teachers. Considering that less than half of the primary school teachers in the system are trained, professional development programs play a critical role in upgrading teachers. Consequently, there is need for more research in this area to ensure that these programs are meeting the needs of teachers and are positively impacting students' performance.

Given the time constraint with the current study, it is recommended that a similar study be replicated over a minimum of one year. Research supports the fact that the implementation of

professional development designed to bring about change is challenging (Pradere, 2007). As a result, research on the effectiveness of professional development is best conducted as longitudinal studies.

This study was ambitious in attempting to address all the components of early literacy–decoding/fluency, vocabulary/comprehension and writing. It is therefore recommended that subsequent researchers investigate teachers' understanding in each area separately. As a result, any one of the components can be developed as a focus of research interest. This is important in trying to understand the needs of teachers in each area and how best to facilitate these needs. This is best achieved when each area is isolated and studied independently.

Another area of research coming out of this study that is supported by the literature is to link professional development to students' achievement to determine if there is any correlation between teachers' demonstrated understanding of the content and students' performance in literacy. To do this, existing data collection mechanism can be utilized. For example, if one were to implement a writing program over two years in the upper grades, the research could collect two sets of data in attempt to look at the relationship between teachers' understanding of writing instruction and students' performance. One set of data would reflect the evaluation of teachers' content and usage of the program and the other data source would be students' performance scores on the National Primary School Examination taken at the end of grade eight.

Summary

Based on the results, the intervention had a positive impact on teachers' learning of literacy content. As was anticipated professional development extended over a longer period of time had a greater impact on teachers' learning. Participants experience and their level of qualification did not appear to influence their performance during the program. The difference

in the results at the end of the intervention can be attributed to other factors. Given that participation was voluntary, teachers' level of motivation and attitude towards learning was perhaps a factor.

Secondly, extending the professional development over an extended time period facilitated the integration of the school and classroom contexts. Teachers learn best when they can see how the content or skill they are learning is directly related to what they are doing in the classroom (Darling-Hammond, 2009). This is critical given that the ultimate goal of professional development is to improve the quality of teaching and by extension students' learning. To make the transition from understanding the content to the application stage, teachers needed support at the school level. This support in the form of coaching helped teachers to reflect on their own learning and to figure out why and how this knowledge was to be used.

Coaching also encouraged teachers who may not readily see the need to implement the writing program, for example. The coaching and the collaborative meetings certainly built the momentum for change. As a result, the success of the program can be attributed to the practical component that allowed teachers to try out new ideas in the classroom with the support of a coach. Finally, there were long term benefits derived from working with a staff as opposed to working with one or two teachers from different schools in a centralized training. In this case, the school approach led to more collaboration among staff members. Participants came together to discuss successes and challenges, but more importantly they served as a support for each other. It was the support structure at the school level that ensured that teachers experimented with ideas and implemented what they learned. This process positively impacted teachers' learning. Teachers with strong literacy content are in a better position to make informed

instructional decisions that can enhance the literacy rate in Belize. Content and pedagogically

savvy teachers are more likely to be effective (Vrasidas & Zembylas, 2004).

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APPENDIX A

Approval to Use Literacy Instruction Knowledge Survey

Literacy Instruction Knowledge Scales

Written Survey©

Nondisclosure Agreement

I, _Rosaline Bradley, also known as Rose_ _____, agree to use the *Literacy Instruction Knowledge Scales – Written Survey* (LIKS-WR) for research purposes only in the research study listed below. I further agree to protect the security and integrity of the LIKS-WR item pool as follows:

1) No paper, digital, or electronic copies or reproductions of any kind will be made or retained of the LIKS-WS item pool after the research project(s) listed below are completed.
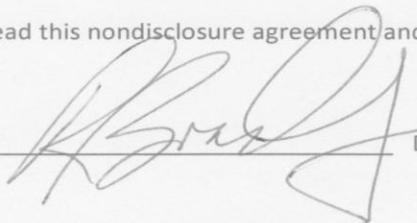
   Research Project Name: _A study to determine the effectiveness of professional development in the area of Literacy on Teacher Quality—_____

   _____

   Expected Completion of Project: __December 2011_____
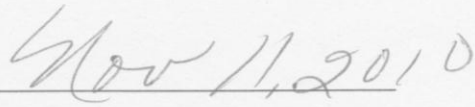
2) Every effort will be made when storing the LIKS-WS instrument, in paper, digital/electronic, or any other format, to protect the security and integrity of the LIKS-WS item pool. I agree when storing the LIKS-WS in its entirety or any of the LIKS-WS items to store the LIKS-WS instrument or any of its items in a secure location or in a password or encrypted computer storage file for which only the authorized individual listed above has access.

3) The LIKS-WS items will not be copied or disseminated to any other person or entity in any form whatsoever.

4) Once the research project is completed, all paper, digital, electronic, or any other copies or reproductions of the LIKS-WS or LIKS-WS items will be stored in secure storage for a period of no longer than seven years as required by law and research ethics. After seven years, all copies and reproductions of the LIKS-WS or any LIKS-WS items are to be disposed of in a manner that maintains the secure nature of the LIKS-WS item pool.

5) Any breaches of this agreement will be prosecuted to the fullest extent of the law under copyright and trademark statutes of the United States of America and any other applicable law.

I have read this nondisclosure agreement and by signing this agree to abide by its stipulations.

Name_____ Date_ Nov 11, 2010

Institutional Review Board Approval

Oklahoma State University Institutional Review Board

Date: Tuesday, February 22, 2011

IRB Application No ED1116

Proposal Title: A Study to Determine the Impact of Professional Development on Teachers' Knowledge of Literacy Content

Reviewed and Processed as: Expedited

Status Recommended by Reviewer(s): Approved   **Protocol Expires: 2/21/2012**

Principal Investigator(s):

Rosaline Teresita Bradley
210 Juliet Soberanis
Belize City Belize, OK 74078

Qiuying Wang
256 Willard
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.
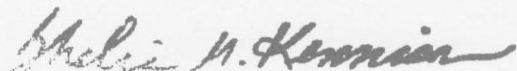
☑ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Shelia Kennison, Chair
Institutional Review Board

APPENDIX C

Letter Seeking Permission from District Manager with Responsibilities for Schools Participating in the Research

Ministry of Education
Quality Assurance & Development Services
P.O. Box 369 University Drive Belize City, Belize
(501) 223-6970/(501) 223-1389

(501) 223-1184
Early Childhood Education and
Development
Fax: (501) 223-4532

Quality Assurance & Development Services

February 10, 2011

District Education Officer

Dear Ms. Alvarez:

I am pursuing a Doctorate in Higher Education through the Department of Educational Studies, Oklahoma State University. As part of the requirement for this degree, I am conducting a study, in Belize, entitled: *A Study to Determine the Impact of Professional Development on Teachers' Knowledge Level of Literacy Content*. The purpose of the study is to measure changes in teachers' content knowledge during the intervention using a Literacy Instruction Knowledge Survey.

I am seeking your permission to conduct this study in select urban schools in your district. Given that the research is focused on early literacy, only infant teachers – teachers from infant I to standard II (equivalent to K through grade III teachers) will be involved. Teachers' involvement will require them to respond to a Literacy Instruction Knowledge Survey at three points during the study. Teachers will also be involved in a one intensive professional development session, followed by ongoing coaching and monitoring at the school level for a period of five weeks.

To coach and support teachers, the researcher and/or a trained literacy coach will visit participants in their respective classrooms during the language arts block. The purpose of these visits is to answer questions, clarify misconceptions, provide feedback and encourage reflective practice. Individual teachers will not receive more than one observation per week. Additionally, all participants within a school will be asked to meet as one group or by grade level for a minimum of one hour and a half per week to discuss/share success stories, challenges and plan strategically as a group for the implementation of ideas gleaned from the training and reflection. This means that during the five-week period, each teacher will be directly involved for a maximum of three hours per week.

Please note that participation is voluntary. Teachers have the right to withdraw from the study at any point during the research. All questionnaires will be coded to conceal the identity of schools and will be destroyed following data analysis. Similarly, in reporting the data, steps will be taken to maintain complete confidentially of the names of teachers. All data will be secured privately, and only the primary researcher will have access to the information. In the event that the research is published, your district, school names and names of teachers will not be identifiable.

Should you have any questions, please contact me at 501-602-2598, or 501-223-0798 or by email at rosevalpy@hotmail.com. You may also email my dissertation advisor at qiuying.wang@okstate.edu. If

Quality Schools Promoting Literacy for a Better Belize

you have questions about your rights as research volunteer, you may contact the Oklahoma State University Institutional Review Board (IRB) Chair, Dr. Shelia Kennison at 219 Cordel North, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu.

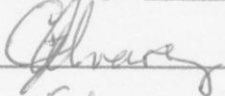Thanking you in advance for your support in this matter.

Respectfully,

_____
Rosaline Bradley,
Doctoral Candidate
Oklahoma State University

I hereby give my permission for my schools to participate in the above named study. I also give my permission for teachers to be observed in their classrooms and to work collaboratively with the other participants within the school. I understand that in reporting the findings, the identity of my school and teachers will be confidential and there will be no way of linking their input to this school. I also understand that the involvement of my school in this research project will not affect the evaluation of the school and that all questionnaires will be destroyed immediately after data analysis.

District Education Centre Manager: _CAKLA   ALVAREZ_____

Signature_____

Date:_____February 14th, 2011_____

APPENDIX D

Teachers' and Principals' Informed Consent

INFORMED CONSENT

Project Title: A Study to Determine the Impact of Professional Development on Teachers' Knowledge Level of Literacy Content.

Investigators: Rosaline Teresita Bradley, M.ED, Reading Education; M.ED, Educational Leadership
Alma Paradez, B.ED (Literacy Coach)

Purpose:
This is a research project designed to compare difference in teachers' knowledge before and after their experience with two modes of professional development. You are being asked to participate in this study in your capacity as an infant teacher. The research will measure your knowledge of literacy content before and after your experience with the intervention.

Procedures:
Your involvement in the study will require the completion of a literacy survey at three points during the intervention; 18 hours of professional development during the first week at an estimated three hours per day and additional 15 hours of professional development spread over a five week period of professional development that will be conducted at your school.

At the start of the study, you will be required to complete the literacy instruction knowledge survey. The survey is divided into three main sections:

1. decoding and fluency
2. vocabulary and comprehension and
3. writing.

The instrument consists of a total of 97 items and will take about 90 minutes to complete. You will then engage in one week of professional development for not more than 18 hours spread over six days at an average of three hours per day .During this period you will receive training in content and strategies to promote literacy: decoding and fluency(phonemic awareness and phonics, high frequency words), comprehension and vocabulary (strategies for before, during and after reading, strategy instruction and techniques to promote vocabulary knowledge) and writing (writing process and mechanics). At the end of this first phase, you will be required to complete the question once again.

During the reminding five weeks the researcher and/or a trained literacy coach will visit you in your classroom during the language arts block. The purpose of these visits is to answer questions, clarify misconceptions, provide feedback and encourage reflective practice as you implement what you garnered for the training. You will not receive more than one observation per week. Additionally, you will be asked to meet with the other participants in your school as one group or by grade level for a minimum of one hour and a half per week to discuss/share success stories, challenges and plan strategically as a group for the implementation of ideas that you all think will help to improve students' literacy performance in your school. This means that during the five-week period, you will be directly involved for a maximum of three hours per

week. At the end of the intervention you will once again be asked to complete the survey.

Risks of Participation:
While there are no known risks associated with this project which are greater than those ordinarily encountered in daily life, there may be some inconveniences. *To minimize the inconveniences of having an observer in your classroom, the researcher or literacy coach will limit the time spent in classroom to one hour. You will always be informed of the visit ahead of time. You will have the right to reschedule visits when necessary.*

Benefits:
This research will give you an opportunity to experience and contribute to the discussion on the merits of different modes of professional development in Belize. You will also be exposed to best practices in the teaching of early literacy. Additionally, you will receive the equivalent of 15 hours towards your license as a teacher.

Confidentiality:
The records of this study will be kept private. Any written results will discuss group findings and will not include information that will identify you. Research records will be stored securely and only researchers and individuals responsible for research oversight will have access to the records. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research.

Compensation:
You will receive 15 hours of professional development. This will be credited towards the required number of hours to maintain your teaching license in Belize. This information will be sent in to the Ministry of Education copied to you no later that August 31, 2011.

Contacts:
Should you have any questions, please contact me at 501-602-2598, or 501-223-079 or by email at rosevalpy@hotmail.com. You may also email my dissertation advisor at qiuying.wang@okstate.edu. You may also contact the Chair of the Institutional Review Board, Oklahoma State University, Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or irb@okstate.edu.

Participant Rights:
Please note that participation is voluntary. If you agree to participate, you can withdraw from the study at any point during the research without penalty. Information shared will be strictly confidential and will not in any way affect your performance evaluation as a classroom teacher. All questionnaires will be coded to conceal the identity of your school and your name and will be destroyed immediately following data analysis. All data will be secured privately, and only the primary researcher will have access to the information. In the event that the research is published, steps will be taken to maintain confidentiality of your school and your name.
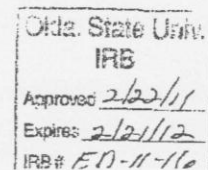
Signatures:

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy of this form has been given to me.

_____   _____
Signature of Participant   Date

I certify that I have personally explained this document before requesting that the participant sign it.

_____   _Feb, 11, 2011_____
Signature of Researcher   Date

Program of Study for Literacy

Improving Literacy Through Teacher Education

Rosaline Bradley

Ministry of Education

Belize

March 2011

Teachers Make a Difference

<u>Developing Teachers' Content Knowledge of Early Literacy</u>

Overview

This training is design for teachers working in the lower grades- Infant 1 (kindergarten) through to Standard 2 (grade three). The training will be done in two phases- an initial week of

training to introduce all teachers collectively to the content, followed by five weeks at the classroom level. Phase one introduces teachers to the components of early literacy through hands-on activities and teaching strategies that promote understanding. As teachers learn *what* to teach, they will simultaneously be learning strategies that they can use to promote literacy development.

During the second phase of the training, teachers will receive additional support in their classrooms and at the school level. It is anticipated that the five weeks of coaching will help teachers to clarify misconceptions, consolidate ideas garnered from the one week of initial training, and most importantly to work collaboratively with each other to address issues that negatively impact students' learning. This process is aimed at helping teachers to set goals all geared toward improving students' achievement. Getting teachers to take ownership is critical since the ultimate goal of professional development is the improvement of students' learning

Description

The program focuses on developing teachers' knowledge of the concepts and skills of effective literacy instruction in the early grades. Teachers learn specific techniques to develop students' oral language in the standard from, literacy and cognition. Content includes concepts for oral language development, phonological awareness, phonics, fluency, vocabulary, comprehension and writing. In addition to content, training exposes teachers to strategies that facilitate learning in each of the critical areas. Through classroom application and feedback, teachers have the opportunity to develop comprehensive understanding of each critical area and how to translate that knowledge into classroom practice.

Objectives

Teachers will:

1. understand the importance of oral language development in the development of literacy;

2. familiarize themselves with activities that develop oral language;

3. understand language issues in the Belizean context that influence literacy development;

4. Develop their understanding of the components of language and how they are interrelated;

5. Identify and use appropriate activities to develop students' phonemic awareness;

6. Be familiar with decoding strategies; phonic elements and word families

7. Identify strategies that promote fluency;

8. Develop an understanding of the concept of structural analysis and what is entailed;

9. Explain how reciprocal teaching and other activities enhance comprehension;

10. Design activities to promote vocabulary development;

11. be able to use the writing process to teach writing across the curriculum and

12. critic writing samples to identify strengths, weaknesses and areas for further development.

Phase I

Day 1

- Overview of the Research Project

- Administration of Literacy Instruction Knowledge Survey

Day 2

Topic: Phonological Awareness

- What is Phonological Awareness?

- The Components of Phonological – Developmental Sequence

- Phonemic Awareness Activities

Topic: Decoding Strategies

- Phonics instruction: synthetic (learning the sounds and blending) and analytic (start with words) approaches

- Analogy- word study activities

Day 3

Topic: Decoding and Fluency

- Structural analysis- compound words

- Contextual analysis

- Basic sight word recognition strategies

Topic: Fluency

- Reading Fluency

    (a) Accuracy

    (b) Appropriate speed

    (c) Expression

- Why is Fluency important?

- Strategies to develop fluency

- Intervention to help struggling readers with fluency

Topic: Vocabulary/Comprehension

- strategies for vocabulary instruction

- Using context clues to teach vocabulary

- Using prefixes and suffixes to figure out the meaning

- Using semantic maps to enhance vocabulary instruction

- Teaching vocabulary across the curriculum

- Using read aloud to develop oral language, vocabulary and comprehension

- Develop reading comprehension: reciprocal teaching

- Reading and thinking aloud

- Working with narratives versus expository texts

- Using graphic organizers to teach comprehension strategies

- Promoting Independent Reading

- Discussing what you are reading

Day 4

Topic: Writing

- The writing process – pre-writing/planning and drafting

- Revising and editing

- Introducing writers' workshop

- Generating different types of texts

Day 5

Topic: Writing

- Assessing writing and providing feedback to students using writing samples

- Administration of the Literacy Instructional Knowledge Survey

Phase II

Coaches visited the schools during week 2 through week 6 to provide support to teachers individually and as a staff. The support provided was dependent on the individual needs of the respective schools and needs of individual teachers. Teachers were observed in their individual classrooms, after which the coach was available to provide feedback and answer questions. Collaborative meetings were also held biweekly to encourage teachers to discuss the areas of study that they were teaching. These meeting were more than the usual planning meetings. The focus was to encourage reflective practice by critically analyzing learning that was taking place. In so doing, the ultimate goal of these sections was to develop a culture of sharing ideas and solving problems related to literacy instruction as a way of improving the quality of teaching as a staff.
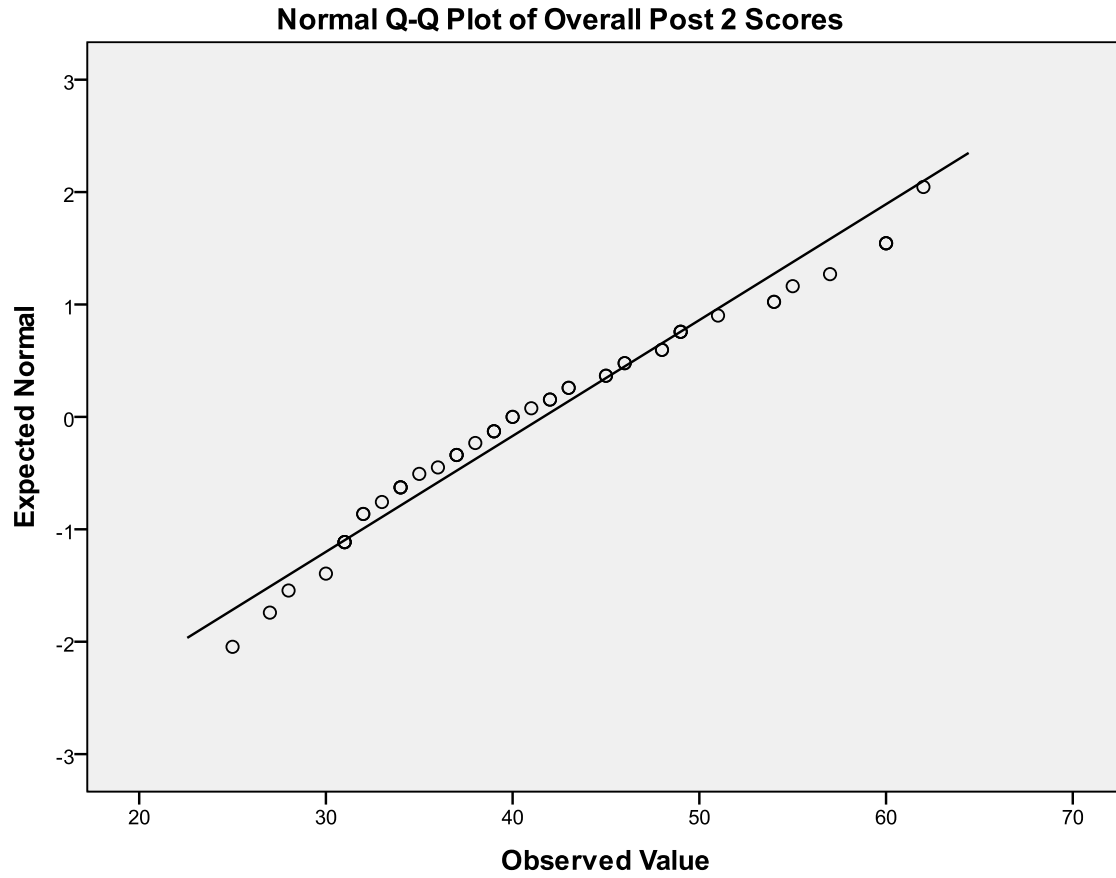
APPENDIX F

Graphic Representation of Test of Normality for Posttest 1

Normal Q-Q Plot of Overall Post 1 Scores
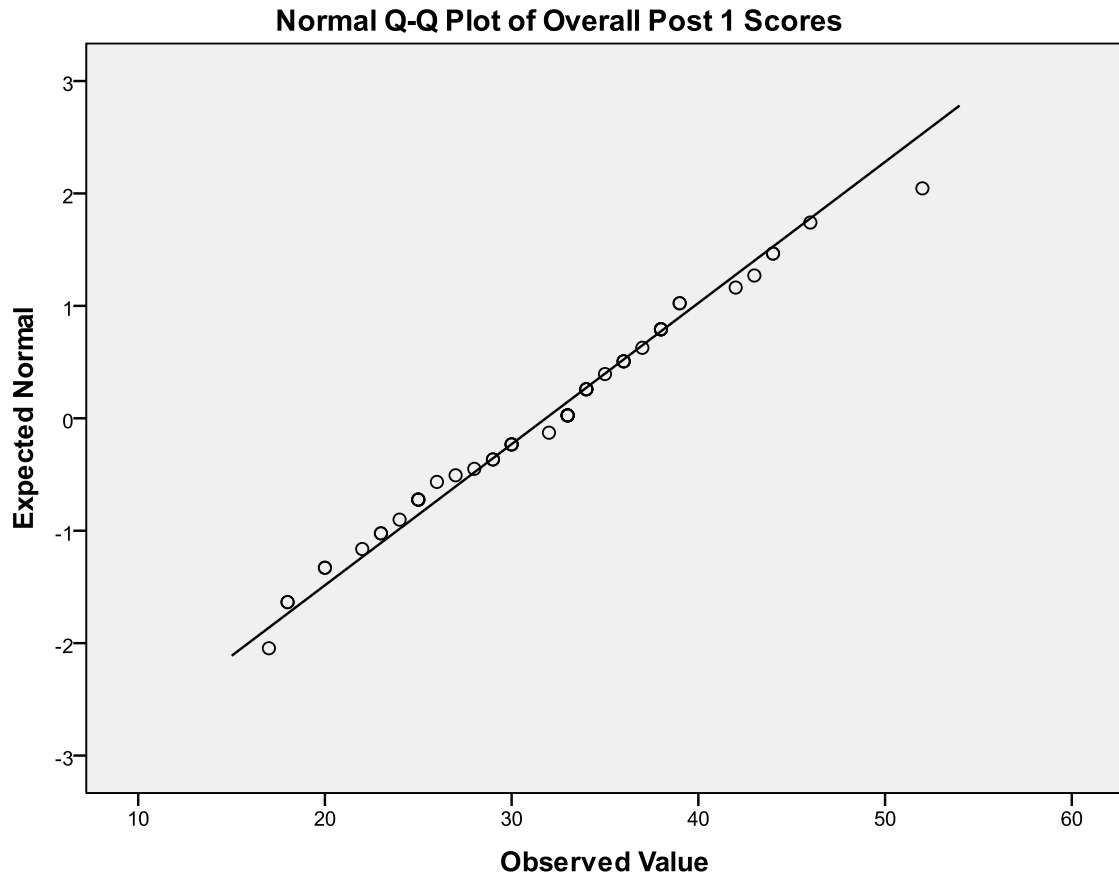
APPENDIX G

Graphic Representation of Test of Normality for Posttest 2

Normal Q-Q Plot of Overall Post 2 Scores

VITA

Rosaline Teresita Bradley

Candidate for the Degree of

Doctor of Education

Thesis: A STUDY TO DETERMINE THE IMPACT OF PROFESSIONAL DEVELOPMENT ON TEACHERS' KNOWLEDGE OF LITERACY CONTENT

Major Field: Higher Education

Biographical: Belizean by birth, married and the mother of four children.

Education:
Completed the requirements for the Doctor of Education in Higher Education at Oklahoma State University, Stillwater, Oklahoma in May, 2012.

Completed the requirements for the Master of Science in Educational Leadership at Valdosta State University, Georgia in 1997.

Completed the requirements for the Master of Science in Reading Education at Valdosta State University, Georgia in 1997.

Completed the requirements for the Bachelor of Arts in English Education at University of Belize, Belize City, Belize in 1992.

Experience:
Education Officer, Belize Ministry of Education, August 2008-Present
Regional Assistant Coordinator, Carbbean Center of Excellence for Teacher Training, University of the West Indies, Cave Hill, Barbados 2006 -2008
Literacy Coordinator, Caribbean Center of Excellence for Teacher Training, University of Belize, 2003-2005
Lecturer, University of Belize Ministry of Education, 2000-2003

Professional Memberships: Belize Institute of Professional Women

Name: Rosaline Teresita Bradley   Date of Degree: May, 2012

Institution: Oklahoma State University   Location: Stillwater, Oklahoma

Title of Study: A STUDY TO DETERMINE THE IMPACT OF PROFESSIONAL

DEVELOPMENT ON TEACHERS' KNOWLEDGE OF LITERACY

CONTENT

Pages in Study: 116   Candidate for the Degree of Doctor of Education

Major Field: Higher Education

Scope and Method of Study: This quantitative study investigated the impact of professional development on Belizean teachers' knowledge of literacy content needed to effectively develop early literacy skills of primary school children between the ages of five to eight. The specific focus of the research was to survey teachers' knowledge level before and after their experience with two different approaches to professional development. Teachers' pretest and posttest scores were compared to determine if there were significant differences in teachers' performance after their exposure to the two different approaches to professional development employed in this study.

Findings and Conclusions: The study revealed that there was an overall significant difference in teachers' knowledge of literacy content after the intervention. Both phases of training indicated significant differences in teachers' performance scores. Socio-cultural and situated learning theories provided the framework that guided the design and supported the explanation of factors that contributed to teachers' learning during their experience with the professional development activities. The mean score for writing was the lowest for the three areas of knowledge surveyed – decoding/fluency, vocabulary/comprehension and writing. Teachers' years of experience and qualification did not influence the results.

Recommendations: Based on the results of this study, it is recommended that professional development programs in Belize be extended over a period of time to incorporate school context and to ensure continuity and sustainability of new programs and ideas. It is also recommended that professional development programs be designed to focus on specific areas of the curriculum. The evaluation of these sessions should be linked to teachers' learning in the specific content area as a first step.

ADVISER'S APPROVAL:_____
                              Dr. Qiuying Wang