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PRESCHOOL TEACHER CHARACTERISTICS:

PROFESSIONAL DEVELOPMENT AND CLASSROOM QUALITY

BY

JILLIAN CONNELLY

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

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IN

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UNIVERSITY OF RHODE ISLAND

2018

MASTER OF SCIENCE

OF

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2018

ABSTRACT

Effects of professional development, moderated by teacher characteristics, on classroom quality in early childhood settings were evaluated using secondary data from the Teacher Professional Development Study (funded by the NCRECE), as accessed through Inter-university Consortium for Political and Social Research (ICPSR). 210 teachers in early childhood settings received different forms of professional development and were randomly assigned to treatment groups. The goal of the professional development was to increase classroom quality as measured by the Classroom Assessment Scoring System (CLASS). At the completion of the study, four groups existed: Course and Consultancy, Course only, Consultancy only, and Control. Initial results showed that teacher characteristics play an important role in the effectiveness of the intervention. Specifically the consultancy component proved to be the most beneficial for teachers who have a bachelor's degree or higher. The course component did not impact CLASS scores. Teacher age had a small influence on the effectiveness of this professional development treatment. The number of years that a teacher has worked in their current program had no effect on classroom quality.

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CHAPTER 1

INTRODUCTION

Professional Development for early childhood teachers takes many forms. According to the National Association for the Education of Young Children (NAEYC), a reputable organization whose goal is to promote quality education and care to young children, "professional development is a continuum of learning and support activities designed to prepare individuals for work with and on behalf of young children and their families, as well as ongoing experiences to enhance this work" ("Professional Development", 2017). It can include (but is not limited to) training specific to the field that is ongoing over the course of a career, one time in service training, workshops, coaching, mentorships, or even peer support, conferences, or online tools for learning. While NAEYC notes that professional development is intended to benefit all teachers ("Professional Development", 2017), each teacher brings a different set of characteristics to the classroom which has the potential to influence the impact of the professional development.

The current study aims to evaluate how teacher characteristics influence the impact of professional development on classroom quality. Classroom quality in early childhood settings is a multidimensional construct that includes promoting overall child development (socially, physically, and cognitively) which results in positive child outcomes, and providing nurturing teacher-child interactions. In the current study, quality is defined as classroom settings where teachers are fostering a positive

learning environment using emotionally supportive and organized teaching strategies. High quality classrooms are associated with children with high academic achievement (Guo, Piasta, Justice, & Kaderavek, 2010; Vitiello, Moas, Henderson, Greenfield, & Munis, 2012).

Professional development contributes to the ongoing learning process of effective teaching and classroom interactions which lead to classroom quality. Single session professional development trainings contribute to stronger instruction practices within the classroom (Gropen, Kook, Hoisington, & Clark-Chiarelli, 2017). Ongoing professional development with 14 or more hours of training time (DeMonte, 2013) increase likelihood that teachers retain new information and are able to implement new skills effectively. It is important to provide a variety of professional development layouts (e.g. single session, ongoing, online modules, and workshops) because teachers respond differently based on individual characteristics and interest (Avalos, 2011). The current study takes a closer look at specific teacher characteristics in order to gain an understanding of how they moderate the effect of a professional development intervention on classroom quality.

The current study uses data from the National Center for Research on Early Childhood Education (NCRECE) Professional Development 2007 – 2011 study which initially showed that the implemented professional development training was successful (Pianta, Hamre, Downer, Burchinal, Williford et al., 2017). Using various analytic strategies, the current study will evaluate whether the effect of the professional development training varied by key teacher characteristics: teacher education level, age of the early childhood teachers, and length of time that the early

childhood teachers have worked in their current program. The specific research question evaluated in the current study is: To what extent do teacher education level, age, and years working in their current program influence the effectiveness of professional development on classroom quality in an early childhood setting? The use of linear regressions and interaction variables will aid in the understanding of teacher characteristics as they relate to professional development and classroom quality. This research will help professionals in the field understand which teacher populations may be in need of professional development in order to increase overall early childhood classroom quality.

CHAPTER 2

REVIEW OF LITERATURE

Classroom Quality

Classroom quality is evident in early childhood settings when teachers provide an emotionally supportive setting for children where organized classroom management is maintained and teachers can implement effective instructional strategies. The elements that make up classroom quality all stress the importance of interactions within the classroom environment. Classroom quality in early childhood settings has been linked to positive child outcomes (Gropen et al., 2017; Son, Kwon, Jeon, & Hong, 2013) such as increased inquiry skills brought on by intentional teaching strategies (Gropen et al., 2017) and better social-emotional development (Son et al., 2013).

Emotional support, one key component of classroom quality, is comprised of relationships between teachers and children based on teacher awareness of the children and responsiveness to child social-emotional needs. Preschool children who have a strong relationship with their teachers are more active learners and develop stronger social skills starting in preschool and continuing through second grade (Peisner-Feinberg et al., 2001). Additionally, emotional support in preschool years increases child interest in social growth (Leana, Appelbaum, & Shevchuk, 2009) which is an important lifelong skill. Learning how to develop friendships, interact in social

settings and even basic understandings of personal hygiene are skills that early childhood teachers encourage on a day to day basis. High quality classrooms foster interest in both social and academic growth. Children who were immersed in preschool programs with teachers who were emotionally supportive had better language skills and slightly better math skills in second grade in comparison to other preschool settings (Peisner-Feinberg et al., 2001).

Organized classroom management is the second of three aspects of classroom quality. Classroom organization combines the use of behavior management skills and efficient layout of learning time and materials throughout the day. As Gropen (2017) discovered, providing children with an engaging learning environment complete with necessary supplies increased interest in the world around them. Engaged learning decreases time for children to feel bored or disengaged. Teachers who provide high quality classroom management are able to utilize effective discipline as needed, structured around positive redirection, which fosters positive decision making skills as children develop (Cunningham, 2010).

The third component of classroom quality is instructional support which measures the delivery of concepts, ability to encourage conversational interactions, and promoting thinking skills through open-ended questions and feedback. One study found that classrooms that supported child directed choices, encouragement to explore both social and academic language use, and opportunities to exchange ideas with both peers and teachers had more successful student progress in language and literacy (Cunningham, 2010). In research on science inquiry skills in the classroom, Gropen and colleagues (2017) discovered that when preschool teachers were taught specific

skills for teaching science in the classroom, increased child learning occurred immediately. The new teaching skills changed how teachers set up the classroom environment to encourage collaborative learning (Gropen et al., 2017). As a result, the classroom environment encouraged curiosity, increased peer and teacher conversations, and influenced the development of vocabulary (Gropen et al., 2017).

Classroom quality in early childhood settings contributes to the overall development of each child. Both short term and long term results have been measured in the research on child outcomes. Exposure to high quality classroom learning fosters both academic and social growth in the early childhood setting as well as setting the tone for lifelong learning (Leana et al., 2009).

Professional Development for Early Childhood Educators

One of the most noteworthy aspects of teacher professional development is that there is no single definition describing what counts as professional development ("Professional Development", 2017; Son et al., 2013). Professional development can include (but is not limited to) any training specific to the field that is ongoing over the course of a career, one time in service training, workshops, coaching, mentorships, or even peer support, conferences, or online tools for learning. Professional development as a whole has themes that appear throughout the literature. In general, when professional development opportunities arise for teachers, the goal is to teach new information while helping teachers learn to convert knowledge into practice (Avalos, 2011). In a report through the Center for American Progress, research found that professional development is most impactful for teachers when it aligns with the goals of the school and includes an active learning environment (DeMonte, 2013).

Incorporating active learning, such as engaging in conversations and hands on practice during professional development experiences, allows teachers to internalize new knowledge and understand how to implement strategies into their teaching. Active learning involves any experience where teacher participation occurs and can be incorporated into single session or ongoing professional development experiences.

Some research supports that teachers who participate in ongoing professional development that includes a coaching, mentor, or consultant component acquire more teacher – child interaction skills (Johnson, Finlon, Kobak, & Izard, 2017), and feel confident both initiating classroom change to improve quality and supporting colleagues in this process (Sims & Waniganayake, 2015). These three components (coaching, mentor, and consultant) encourage collaboration and feedback between the teacher and the individual providing the paired support. Results of this active learning environment has been shown to be critical in improving classroom quality (DeMonte, 2013; Johnson et al., 2017; Sims & Waniganayake, 2015; Son et al., 2013). This type of professional development will referred to as 'consultancy' throughout the current study.

Research by Johnson et al. (2017) included an initial two part class (1.5 hours per class) for teachers to learn about and discuss the importance of teacher – child interactions and to learn how to be peer coaches for one another followed by 7 weeks of peer consultancy. Using the same scale that is being used in the current study, results from pre- and posttest scores showed statistically significant ($p < .05$) increases for teachers in the treatment group in emotional support by teachers towards students as well as in classroom organization, which consists of behavior management and

fluidity in daily routine that maximizes learning time (Johnson et al., 2017). The teacher participants who were a part of the treatment group (12 of 24 teachers) reported feeling supported by the accessibility of the intervention within their classroom setting (Johnson et al., 2017).

An additional study analyzed secondary Head Start data of 310 teachers and 2,159 students in an effort to predict which teacher qualities were best suited to increase the learning of Head Start students (Son et al., 2013). Among other teacher data, teachers self-reported how many hours of professional development (labeled "specialized training") they completed in the 12 months prior and also reported information about exposure to ongoing consultancy practices available (Son et al., 2013). Using variables from teacher reported data along with classroom scores from a reputable scoring system used in early childhood settings, professional development that included some level of consultancy was a significant ($p < .05$) predictor of the classroom environment (Son et al., 2013). Qualitative data from teachers about professional development (Johnson et al., 2017) and quantitative data from classroom evaluation scores (Johnson et al., 2017; Son et al., 2013) support the importance of professional development targeting the individual needs of each teacher (Carlson, Curby, Brown, Trygstad, & Truong, 2017).

These same studies (Johnson et al., 2017; Son et al., 2013) provide information on professional development that suggests that a consultancy based intervention is not the perfect fit for all teacher training needs. The consultancy intervention in the work by Johnson and colleagues (2017) had no impact on the instructional support measures of the scale. Instructional support measures teachers' abilities to facilitate learning and

provide meaningful feedback to enhance the learning of concepts. Specialized training, such as the science training (Gropen et al., 2017) previously discussed, appears to be a stronger method of increasing individualized or subject specific teaching strategies. Professional development that includes a consultancy component reinforces the importance of feedback and collaboration in relation to improving classroom quality (DeMonte, 2013; Johnson et al, 2017). Other opportunities for specialized training, through more course based delivery methods, such as workshops or seminars, allow teachers to increase knowledge in specific areas based on need or interest (Avalos, 2011).

The literature on professional development for early childhood teachers provides insight to the impact of professional development delivered in different ways. Professional development that is delivered in a more course like manner appears to be more beneficial as teachers learn strategies based on instructional teaching. Longer professional development experiences that involve implementation and feedback appear to influence teacher – child interactions and the classroom environment. The next step is to understand how individual teacher characteristics may influence these connections.

Early Childhood Teacher Education Level

Child care centers have a variety of regulations that must be followed, which include regulations set at federal, state, and/or individual school levels. They cover topics such as health and safety, nutrition, curriculum and planning, and staffing. Over time, alterations are made to better regulate the centers. Education standards for teachers in early childhood education are lower than those required for teachers in

other teaching settings (Miller & Bogatova, 2009). A systemic change has begun to take effect in this regard over the last ten or so years. Regulations put in place for teacher qualifications at both the state and federal levels have changed, encouraging schools to have a higher percentage of teachers with college degrees (Bassok, 2013; Son et al., 2013). The belief of researchers and policy makers is that early childhood teachers who have a degree in early childhood or child development will close school readiness gap through higher quality teaching (Miller & Bogatova, 2009; Son et al., 2013).

The connection between teacher education level and classroom quality may not be linear (Kelley & Camilli, 2007; Miller & Bogatova, 2009; Torquati, Raikes, & Huddleson-Casas, 2007). For example, in a 32 study meta-analysis of classroom quality research for children who attended child care centers, results show a positive relationship between teachers who have at least a bachelor's degree and child outcomes on standardized tests (Kelley & Camilli, 2007). However, teachers who do not have a bachelor's degree also foster the growth and development of young children. For example, Torquati et al., (2007) observed 223 classrooms and found that teachers with a Child Development Associate Credential (CDA) scored higher on quality scales than teachers with four year education degrees. This finding was supported by research that teachers with a CDA were more likely to have taken courses providing knowledge and strategies specifically for working in a setting with children age birth to five than teachers with other degrees or certifications (Torquati et al., 2007). Other research finds that teachers with bachelor's degrees in early childhood commonly have students with higher child outcome scores in early reading

(Son et al., 2013), math skills (Peisner-Feinberg et al., 2001), and cognitive development (Kelley & Camilli, 2007); however, teacher – child relationships and child social development do not appear to differ for teachers who have a bachelor's degree or higher in comparison to those who do not.

Finally, Early, Maxwell, Burchinal, Alva, Bender et al. (2007) analyzed data from seven studies looking at early childhood care. The studies showed that providing supports to encourage effective teacher – child interactions had a greater impact on classroom quality than increasing teacher degree (Early et al., 2007). Taken together, this research suggests that more research is needed in order to understand whether the effectiveness of professional development will vary by teacher education level.

Teacher Experience

Another factor that may influence the effectiveness of professional development in relation to classroom quality in early childhood settings is teacher experience. In a 1997 survey of preschools nationwide, research showed that in a sample of 1,902 teachers of 3 and 4 year olds, that average number of years that a teacher had worked in their position was 6.8 years and the average age of teachers in the sample is 39 years old (Saluja, Early, & Clifford, 2002). While this study is comprised of data from over 20 years ago, such a low average in years worked in a position implies high turnover rates of teachers, disrupting classroom consistency. Similar research noted that teachers show the most growth in their teaching skill in the first three years of teaching whereas teachers in their fifth year show comparable skill as teachers in their twenty-fifth year (Hanushek, 2011). This is also supported in longitudinal research of teacher experience that suggests in a teachers' initial years of

teaching, teachers have less effective teaching methods than they do with more years of experience (Rice, 2010). Between newer teachers needing guidance and more experienced teachers feeling secure in their teaching role, the benefits of professional development training may vary between newer versus experienced teachers.

Teacher Age

The age of an early childhood teacher may contribute to the relationship between professional development and classroom quality. Existing literature provides some information on the role that teacher age plays in the classroom. A 692 pre-k classroom study across 11 states measured teacher, program, and classroom characteristics and their association to emotional and instructional support in the classroom (LoCasale-Crouch et al., 2007). Classroom quality was measured on five levels ranging from high quality to low quality and the researchers did not find a connection between teacher age and classroom quality (LoCasale-Crouch et al., 2007) concluding that other teacher characteristics must influence classroom quality. Kesner (2000) looked at the impact of teacher characteristics in relation to teacher-child relationships from an attachment perspective. Results from the study of 138 preservice teachers found that age was not a predictor of the strength of the teacher-child relationship (Kesner, 2000). However, a study of 400 Pakistani teachers suggests that teacher age is a predictor of job performance in teachers (Hanif et al., 2011). In addition, a study of Finnish students (Mullola et al., 2011) suggests that teacher age can be associated with motivation of teachers. This research contains a study of 60 teachers and 1,063 students and addresses student success in math and language classes. Though the research focused mainly on student achievement for the ninth

grade students, findings suggest that younger teachers gave more weight to child characteristics (i.e. educational competence) when grading students (Mullola et al., 2011).

A gap in the literature presents itself when searching for information about teacher age of early childhood educators in the United States. It appears that teacher age is not a common variable in research about early childhood classroom settings. While yearly professional development is often mandated through state regulations, teachers often have the freedom to seek out professional development that is of interest to them. With the availability of online webinars in addition to in person classes, teachers of all ages are exposed to professional development on diverse topics through multiple modalities. This gap presents a reason to look into teacher age in the current study and calls for more researchers to do the same in future research.

Theoretical Framework

Teachers, students, and classroom supplies are all necessary for a classroom to function. While teachers are expected to provide quality care, the teacher expectations pertaining to education level for teaching in early childhood settings are lower than that those of other school settings (Miller & Bogatova, 2009). Teachers in the early childhood field are encouraged but typically not mandated to have college degrees in comparison to teaching certifications for teachers of kindergarten classes and older. Teachers in the early childhood field who are given an opportunity for growth through experiences such as professional development can increase their overall teaching knowledge and learn additional teaching skills and strategies. From a theoretical perspective, Dynamic Systems Theory, which emphasizes development as an

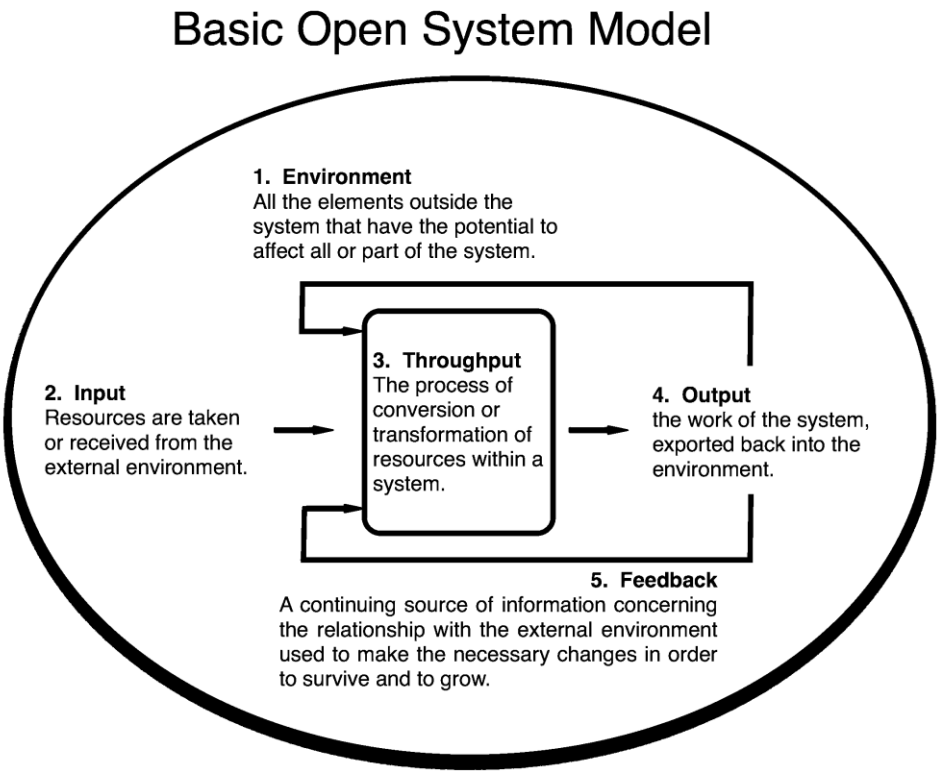
interaction of internal and external systems, is used to understand how the interactions of various subsystems classroom quality.

Dynamic Systems Theory

Dynamic Systems Theory explores development as an ongoing process and evaluates patterns and systems as they develop (Newman & Newman, 2016). Figure 1 (adapted from Newman & Newman, 2016) illustrates the Basic Open Systems Model, a critical part of the overall theory. It shows how the structure itself maintains shape, while the organization within changes over time. This is to say that while the goal of high classroom quality (the overall structure) remains the same, the factors that influence quality may shift and evolve throughout the process.

Figure 1.

Dynamic Systems Basic Open System Model



As a whole, the goal of the Open System Model is to avoid disorganization while incorporating the environment and integrating new information (Newman & Newman, 2016). Professional development dysregulates the teaching trajectory as new information is introduced. Environmental factors such as the age of the teachers, years of experience, and education level influence the interpretation and ability to turn new information into practice. As reregulation happens, some teachers may alter their teaching strategies based on new information and results influence the classroom environment. Alternatively, other teachers may block the integration of new information, resulting in dysregulation of the structure. Feedback occurs as the classroom environment shifts and as individuals implementing the professional development observe changes and relay observations back to the teachers. The process within the structure is ongoing and cyclical. As seen in Figure 1, environment (i.e. teacher age, years of experience, and level of education), input (i.e. professional development), output and feedback all contribute to throughput. These ongoing factors aim to reregulate the organization of the structure in an effort to reach a state of equilibrium.

Because the ongoing process of teaching over time is influenced by internal (e.g., teacher characteristics) and external (e.g., Professional Development) teaching factors, Dynamic Systems Theory supports the importance of evaluating the interaction between environmental factors and professional development strategies as they pertain to increased classroom quality.

Conclusion

The purpose of the current study is to measure the extent to which teacher characteristics influence the relationship between professional development and classroom quality. When teachers are provided with the necessary learning tools, it is believed that they can successfully take what they know and turn it into a classroom practice resulting in a rich learning environment. Using Dynamic Systems Theory, however, the effects of professional development will be influenced by teacher education level, teacher age, and the number of years that teachers have worked in their current program. This research will expand on existing literature to help administrators and policy makers understand how to maximize the use of resources to increase early childhood classroom quality.

CHAPTER 3

METHODOLOGY

Data Source

The original Teacher Professional Development Study (funded by the NCRECE), as accessed through Inter-university Consortium for Political and Social Research (ICPSR), measured classroom, teacher and student outcomes based on professional development training delivered to early childhood education teachers in ten settings across eight states. The research was comprised of both coursework and consultation support with the goal of increasing child language and literacy skills by teaching and coaching concepts related to positive teacher-child interactions (Pianta et al., 2017). The current study will use secondary data from the longitudinal NCRECE Teacher Professional Development Study (2007 – 2011) to evaluate the extent to which teacher education level, teacher age, and years worked in current program interact with professional development and influence classroom quality as measured by early childhood education teachers' Classroom Assessment Scoring System (CLASS) scores at the end of the study.

Sample and Study Design

The original study initially reached out to 490 preschool teachers in community based centers (both public and private) and Head Start preschool settings (Pianta et al., 2017). The sample size for the current study is 210 teachers, which is a result of the sample size from the original study changing as well as screening out missing data in the current study. Phase I of the study randomly assigned 427

participants to two groups: the treatment group received coursework on language and literacy in early childhood for one year and the control group did not. Coursework consisted of 18 video observations (teachers observed and were asked to describe the teacher-child interactions that took place in the video), 6 guided reading notes (teachers were asked to document information from their classroom), 2 reflection papers (teachers were asked to reflect on teaching practices implemented in their classroom), and a midterm and final test (test content was based on knowledge related to CLASS). At the start of Phase I, 218 teachers were enrolled in the course and the control group was made up of 209 teachers. Throughout the year, 95 teachers permanently dropped out leaving a sample size of 332 teachers (course n = 151, control n = 181) at the end of Phase I.

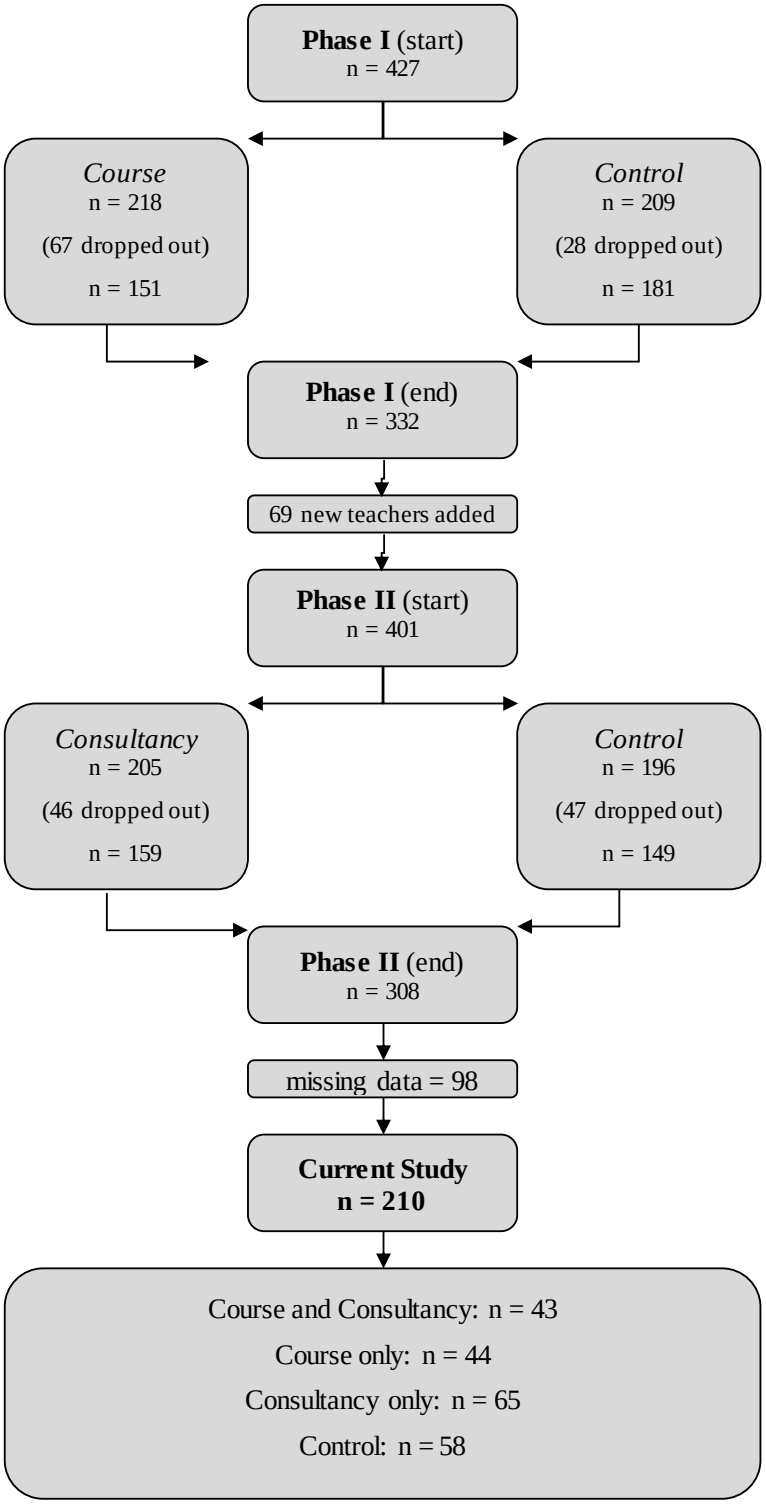
Phase II began shortly (exact time varied based on location) after the completion of Phase I. At this time, 69 new teachers were added to the study and are categorized as part of the control group from Phase I because they did not participate in the course. All 401 teachers were randomly assigned into two groups: one group received classroom support and feedback (labeled the consultancy group) and the second group did not (labeled the control group). Each teacher in the consultancy group was paired with a trained consultant. Every two weeks the pair had a conversation that evaluated a video segment that the teacher had taped in the classroom. The teacher and the consultant discussed teaching strategies and practices used and concluded sessions with an action plan for upcoming teaching experiences. At the start of Phase II, 205 teachers participated in the consultancy treatment however 46 dropped throughout the phase resulting in a sample size of 159 teachers. The

control group in Phase II was initially made up of 196 teachers but the final sample size was 149 after 47 teachers dropped out of the control group during Phase II. Noted in Pianta et al. (2017), the sample size drop was a result of three main factors: teachers moving, changing classrooms, or changing professions. The flow of the changing sample size is depicted in Figure 2.

At the completion of Phase II there were four groups in the study: 1. Course and Consultancy (n = 43), 2. Course only (n = 44), 3. Consultancy only (n = 65), 4. Control (n = 58). Phase III was voluntary for teachers and involved classroom observations only, in accordance to the CLASS scale. There were no treatments implemented in Phase III. The Phase III sample size that is used in the current study is 308 teachers. Any participant who was missing teacher age, teacher education level, or number of years working in the program data (n = 98) was dropped for the current study. Upon the comparison of data for participants removed from the current study and participants who remain, no significance ($p < .05$) resulted. The final sample size used in the current study is 210 teachers and each teacher has available data for all variables used in the analysis.

Figure 2.

Sample Size by Phase in Teacher Professional Development Study (2007 - 2011)



Measures

Dependent Variable: Classroom Quality

The dependent variable, classroom quality, will be measured using CLASS scores at the end of the NCRECE Teacher Professional Development Study (2007 – 2011). Observations in Phase III were collected after one year of course training (Phase I) and one year of consultancy (Phase II). The Classroom Assessment Scoring System (CLASS) measures the quality of a classroom based on teacher-child interactions in a classroom (Hamre, Goffin, & Kraft-Sayre, 2009). The eleven dimensions measured (positive classroom climate, negative classroom climate, teacher sensitivity, regard for student, behavior management, productivity, instructional learning formats, concept development, quality of feedback, language modeling, and literacy focus) each consist of three or four items. Trained practitioners observe and score classrooms for each item on a seven point Likert scale where 1-2 signifies a low score, 3-5 a middle score, and 6-7 a high score. Initial scoring is completed by averaging scores of all items within its corresponding dimension. As described below, the eleven dimensions are grouped together into one of three domains, Emotional Support, Classroom Organization, and Instructional Support, which are the domains being used in this study (Hamre et al., 2009). Averaging positive climate, negative climate, teacher sensitivity and regard for student results in the Emotional Support score. Averaging behavior management, productivity, and instructional learning formats results in the Classroom Organization score. Lastly, averaging concept development, quality of feedback, language modeling, and literacy focus results in the Instructional Support score. The current study will focus on these three domains.

Research from over 3,000 studies has shown that children who are taught in classrooms with higher CLASS scores show higher levels of social skills, language skills, literacy skills and math skills (Hamre et al., 2009). The connection between the successful development of the children and the corresponding classroom CLASS scores over time speaks to the validity of the CLASS tool. As expressed in the *Implementation Guide* for the CLASS tool, reliability is ensured through ongoing trainings of observers (Hamre et al., 2009). One aspect of the traditional two day training is a reliability test that observers must pass in order to become certified (Hamre et al., 2009). Within the reliability test, observers must code 15 video segments and score within 1 point of the master score on at least 12 of the 15 videos (Hamre et al., 2009). This ensures overall reliability of CLASS when used in the classroom. Additionally, CLASS observers must be recertified each year, and the *Implementation Guide* suggests that observers complete between ten and twenty observations per year in conjunction with monthly meetings and video review in order to provide feedback that will ensure that scoring and coding remains reliable (Hamre et al., 2009).

Independent Variable: Professional Development

Receipt of professional development is an independent variable in this study. After removing participants with missing data (n = 98), remaining participants (n = 210) were coded into a new variable based on Phase I and Phase II conditions. As a result, this new variable includes four categorical values: 1. Course and Consultancy, 2. Course only, 3. Consultancy only, 4. Control. After exploratory analyses were conducted, dummy variables for groups 1 -3 were created for linear regression analyses.

Moderator: Early Childhood Education Teacher Education Level

For the purpose of this study, teacher education level serves as a moderating variable. Data for this variable were self-reported by teachers in a questionnaire prior to Phase I of the professional development implementation. These data are categorical where early childhood education teachers reported their highest post high school education as: lower than an associate's degree, an associate's degree, a bachelor's degree, or higher than a bachelor's degree. For this study, data are recoded into a dichotomous variable in which the two levels are 'lower than a bachelor's degree' and 'a bachelor's degree or higher.'

Moderator: Age of Early Childhood Education Teacher

Early childhood education teacher age, measured in years, is a moderating variable in the analysis of the data. Teachers self-reported this data in a demographic questionnaire at the start of the study (prior to Phase I).

Moderator: Years Worked in Current Program

Self-reported data from the demographic questionnaire includes the number of years that early childhood education teacher worked in their current program. These data were reported at the start of the study (prior to Phase I).

Analysis

All data analysis was run using SPSS 24. The first step in the analysis was to drop all participants with missing CLASS scores from the study. Next, descriptive statistics and frequencies were conducted on education level of early childhood teachers, age of early childhood teachers, number of years in their current position, and professional development. The purpose of preliminary analysis of the CLASS was to check the internal consistency of the scale. After, a cross tabulation was conducted to compare the frequency distribution of education level by receipt of professional development. In addition to the cross tabulation, results of two ANOVAs compared the means of teacher age and the means of number of years working in the program by each by receipt of professional development. Next, linear regression analyses were run on each of the three CLASS domains. Dummy variables for each of the three treatment groups were created, and the control group was omitted. Professional development dummy variables were added in the first block to evaluate the strength of the relationship between professional development and CLASS scores. Teacher age, number of years worked in the program, and teacher education level were added in the second block. Adding the moderating variables in the second block explored how this set of variables may have contributed to the relationship between the independent variable (professional development groups) and the dependent variable (CLASS

scores). The third block includes interaction variables between treatment groups and moderating variables. Interaction variables were created based on significance of teacher characteristics found in block 2. This analysis explained the amount of variance that each variable contributes to CLASS scores and whether individual factors were significant predictors of classroom quality.

CHAPTER 4

FINDINGS

The first analyses conducted explored the study sample and provided data on overall teacher demographics and CLASS scores. Teacher characteristics are displayed in Table 1. The average age of teachers is 42.5 years old (*SD* = 10.5), the average number of years teachers in this study have worked in their program (at the start of the study) is 8.5 years (*SD* = 6.4), and 63.8% of teachers have a bachelor's degree or higher. Overall, teachers had higher scores in the Emotional Support and Classroom Organization domains with scores falling within the middle range of the CLASS scale whereas Instructional Support scores are in the low range of the CLASS scale.

Table 1.

Descriptive Characteristics for Early Childhood Teachers (N = 210)

Characteristic	*M* (*SD*)
Age	42.5 (10.5)
Years in Program	8.5 (6.4)
Teacher Education Level % (*n*)	
Lower than a bachelor's degree	36.2 (76)
Bachelor's degree or higher	63.8 (134)
CLASS Scores	
Emotional Support	5.32 (.8)
Classroom Organization	5.14 (.8)
Instructional Support	2.37 (.7)

The second step of the analysis process was an ANOVA conducted to compare the mean ages of teachers and the number of years teaching in the program by treatment group. There was no significant difference ($p < .05$) between the groups for either variable. A chi-square analysis compared education level of teachers in each of the treatment groups and the control. The chi-square value = .143 (df = 3) confirms no significant difference by education level means across treatment groups. Results of these tests are displayed in Table 2.

Table 2.

Demographic Data of Teacher Age, Number of Years Teaching in Program, and Education Level of Teachers (n =210)

Demographics	Course and Consultancy (n = 43)	Course only (n = 44)	Consultancy only (n = 65)	Control (n = 58)	
m Age of teacher (*SD*)	42.67 (10.7)	42.27 (10.5)	41.89 (11)	43.07 (9.9)	p = .937
m Number of years teaching in program (*SD*)	6.56 (4.3)	8.77 (7.2)	8.77 (6.6)	9.34 (6.7)	p = .161
Education Level					p = .143
% Lower than a bachelor's degree (*n*)	21.1 (16)	23.7 (18)	36.8 (28)	18.4 (14)	
% Bachelor's degree or higher (*n*)	20.1 (27)	19.4 (26)	27.6 (37)	32.8 (44)	

A bivariate analysis of the three moderating variables (teacher age, years working in their current program, and education level) was conducted in order to measure in which the variables are measuring the same information. Results show that a weak correlation exists between data for teacher age and years working ($r = .31$, $p < .001$) but no significant correlation exists otherwise.

Table 3.

Correlation Analysis of Moderating Variables

	Teacher age	Number of years worked in current program	Education level
Teacher age		.31***	-.095
Number of years worked in current program			.012

*** $p < .001$

Next, three hierarchical linear regression analyses were used to develop a model for predicting CLASS scores. First, a hierarchical linear regression was used to predict CLASS scores in the Emotional Support domain. Table 4 shows the results of this analysis. No overall or individual significance ($p < .05$) was found when a regression was run using only the treatment groups (Model 1). Model 2 showed overall significance, $F(3, 203) = 2.721$, $p = .046$. Specifically, teacher age is close to significant ($p = .061$), showing a negative relationship between the age of a teacher and the predicted Emotional Support CLASS scores. This means that younger teachers have higher Emotional Support CLASS scores than older teachers. Having a bachelor's degree or higher is close to significant ($p = .059$), showing a positive relationship between the education level of the teacher and Emotional Support CLASS scores.

Table 4.

Hierarchical Regression Analysis for Variables Predicting Scores on Emotional Support CLASS Scores (N=210)

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	*B*	*B*	*SE B*	*B*	*B*	*SE B*	*B*
PD Groups (omitted = no PD)									
Course and Consultancy	.175	.170	.084	.206	.171	.099	.657	.999	.315
Course Only	.011	.169	.005	.042	.169	.020	.378	.957	.183
Consultancy Only	.030	.153	.017	.062	.153	.034	-.500	.884	-.275
Teacher Age				-.011	.006	-.137[a]	.006	.011	.075
# Years Worked in Program				.002	.010	.014	.001	.010	.009
Bachelor's Degree or Higher				.232	.122	.133[a]	-.205	.254	-.117
Course and Consultancy x Teacher Age							-.305	.016	-.737*
Course x Teacher Age							-.022	.016	-.477
Consultancy x Teacher Age							-.013	.015	-.320
Course and Consultancy x Bachelor's Degree or Higher							.600	.367	.494
Course x Bachelor's Degree or Higher							.348	.360	.284
Consultancy x Bachelor's Degree or Higher							.672	.331	.620*
Adjusted R^2		-.008			.016			.036	
F for change in R^2		.420			2.721			1.683	
Sig. *F* Change		.739			.046			.127	

* $p \leq .05$; [a] < .07

Model 3 adds the interaction terms for the two near significant teacher characteristics (age and education) with treatment status and shows no overall significance (p = .127). However, results from the interaction between the course and consultancy group and teacher age resulted in a significant (p = .036) yet negative relationship with predicted Emotional Support CLASS scores. Also within Model 3, the interaction between receiving the consultancy only and having a bachelor's degree or higher is a statistically significant (p = .043) predictor of Emotional Support CLASS scores. Thus the interaction terms are stronger predictors of Emotional Support CLASS scores than the variables on their own.

Next, an independent sample t test was conducted to clarify that the direction of the interaction between the education level variable and the consultancy group matches results of the regression analysis. The higher education consultation group did better in the Emotional Support domain as predicted by the regression analysis, and results are statistically significant, $t(63) = -2.14$, p = .036. Results from the t test show a mean score of 5.03 (SD = .9) for teachers in the consultancy group with lower education levels and a mean score of 5.51 (SD = .9) for teachers in this group with higher education levels.

A post-hoc series of linear regression were conducted to describe the interaction of teacher age as a predictor of Emotional Support CLASS scores by treatment group (Table 5). Results from the linear regression shows a significant negative relationship between teacher age and Emotional Support for those in the course and consultancy group (p = .000) but no significance between teacher age and Emotional Support for the other treatment groups. This correlation is negative, meaning as age increases,

Emotional Support CLASS scores decrease for participants in the course and consultancy group only suggesting that younger teachers benefitted more from this type of professional development. It is important to note this distinction because as seen in Table 4, teacher age is negatively correlated to Emotional Support CLASS scores (p = .061) but when picked apart, this correlation is close to significant due to the interaction of the course and consultancy group and teacher age.

Table 5.

Regression Analyses for Teacher Age Predicting CLASS scores on Emotional Support CLASS Scores by Treatment Group

Treatment Group	*B*	*SE*	*B*	Adjusted R^2	F for Change in R^2	Sig of F Change	*n*
Course and Consultancy	-.031	.011	-.414***	.151	8.488	.006	43
Course only	-.016	.012	-.204	.019	1.825	.184	44
Consultancy only	-.010	.011	-.119	-.001	.014	.345	65
Control	.007	.010	.088	-.010	.436	.512	58

*** $p \leq .001$

A second hierarchical linear regression analysis was run to predict Classroom Organization CLASS scores (Table 6). No overall or individual significance ($p < .05$) was found when a regression was run using only the treatment groups (Model 1). Model 2 showed overall significance, F(3, 203) = 4.72, p = .003.Teacher age in Model 2 is a statistically significant (p = .033) predictor of Classroom Organization CLASS scores. The relationship is negative meaning that younger teachers have higher scores than older teachers. Having a bachelor's degree or higher is a statistically significant (p = .007) predictor of Classroom Organization CLASS scores and the relationship is positive.

Table 6.

Hierarchical Regression Analysis for Variables Predicting Scores on Classroom Organization CLASS Scores (N=210)

	Model 1			**Model 2**			**Model 3**		
Variable	*B*	*SE B*	*B*	*B*	*SE B*	*B*	*B*	*SE B*	*B*
PD Groups (omitted = no PD)									
Course and Consultancy	.159	.166	.078	.193	.164	.095	.404	.961	.199
Course Only	.059	.165	.029	.102	.162	.051	.373	.920	.186
Consultancy Only	.153	.149	.086	.199	.147	.112	-.503	.850	-.284
Teacher Age				-.012	.006	-.154*	.003	.011	.036
# Years Worked in Program				-.001	.009	-.008	-.001	.009	-.009
Bachelor's Degree or Higher				.320	.117	.188**	-.133	.245	-.078
Course and Consultancy x Teacher Age							-.025	.016	-.543
Course x Teacher Age							-.026	.016	-.574
Consultancy x Teacher Age							-.011	.014	-.279
Course and Consultancy x Bachelor's Degree or Higher							.489	.353	.414
Course x Bachelor's Degree or Higher							.489	.346	.409
Consultancy x Bachelor's Degree or Higher							.704	.318	.667*
Adjusted R^2		-.008			.044			.059	
F for change in R^2		.477			4.720			1.518	
Sig. *F* Change		.698			.003			.174	

* $p \leq .05$; ** $p \leq .01$

Model 3 adds in the interaction terms for the two significant teacher characteristics (age and education) and showed no overall significance (p = .174). However, the interaction between receiving the consultancy only and having a bachelor's degree or higher in Model 3 is a statistically significant (p = .028) predictor of Classroom Organization CLASS scores. When interactions are introduced to the regression, individual teacher age and teacher education level variables no longer show significance.

Next, an independent sample t test was conducted to better understand the direction of the relationship between teachers with lower education levels who received the consultancy and teachers who received the same treatment but have higher education levels. Teachers with higher education in the consultation group did better in the Classroom Organization domain as predicted by the regression analysis, and results are statistically significant, $t(63) = -2.85$, $p = .006$. Teachers with lower education levels in the consultancy group had lower CLASS scores ($M = 4.85$, $SD = .9$) and teachers with higher education levels who were a part of the consultation group had higher scores ($M = 5.46$, $SD = .8$).

A final hierarchical linear regression analysis was run to predict Instructional Support CLASS scores (Table 7). As with the other two domains, no overall or individual significance ($p < .05$) was found when a regression was run using only the treatment groups (Model 1). Model 2 showed overall significance, $F(3, 203) = 7.305$, $p = .000$. Specifically, both the consultancy only group and a bachelor's degree or higher are statistically significant predictors of higher Instructional Support CLASS scores ($p = .034$ and $p = .000$, respectively).

Table 7.

Hierarchical Regression Analysis for Variables Predicting Scores on Instructional Support CLASS Scores (N=210)

	Model 1			Model 2			Model 3		
Variable	*B*	*SE B*	*B*	*B*	*SE B*	*B*	*B*	*SE B*	*B*
PD Groups (omitted = no PD)									
Course and Consultancy	.101	.142	.058	.148	.138	.085	-1.031	.513	-.590*
Course Only	.055	.141	.032	.119	.136	.069	-.798	.502	.460
Consultancy Only	.194	.128	.127	.265	.124	.174*	-1.194	.460	-.783**
Teacher Age				-.007	.005	-.099	-.006	.005	-.096
# Years Worked in Program				-.002	.008	-.014	.000	.008	.002
Bachelor's Degree or Higher				.419	.099	.268***	-.134	.204	-.091
Course and Consultancy x Bachelor's Degree or Higher							.684	.292	.671*
Course x Bachelor's Degree or Higher							.518	.288	.504 [a]
Consultancy x Bachelor's Degree or Higher							.864	.264	.951***
Adjusted R^2		-.003			.82			.117	
F for change in R^2		.822			7.305			3.738	
Sig. *F* Change		.483			.000			.012	

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$; [a] = .074

Model 3 adds the interaction term for the single statistically significant teacher characteristic (education) and showed overall significance, $F(3, 200) = 3.738$ $p = .012$. Receiving both the course and consultancy and receiving only the consultancy were significant ($p = .046$ and $p = .010$, respectively) in Model 3. Both variables were negative predictors of Instructional Support CLASS scores which means that as compared to the control group, those receiving these types of professional development had lower Instructional Support CLASS scores. The interactions between receiving the course and consultancy and having a bachelor's degree or higher and receiving the consultancy only and having a bachelor's degree or higher showed statistically significant results ($p = .020$ and $p = .001$, respectively). The positive relationships of these interaction variables explain that the effects of the interaction variables are stronger predictors of Instructional Support CLASS scores than the variables on their own.

Next, three independent sample *t* tests were conducted to evaluate the direction of the interaction between each of the three treatment groups (course and consultancy, course only, and consultancy only) and education levels of teachers. Results from this test showed that, for those in the course and consultancy group, teachers with a lower education level had lower scores ($M = 2.02$, $SD = .6$) and teachers with higher education levels had higher scores ($M = 2.59$, $SD = .6$) and results are statistically significant, $t(41) = -3.13$, $p = .003$. The second independent sample *t* test for teachers in the Course Only group showed that teachers with a lower education level had lower scores ($M = 2.10$, $SD = .5$) and teachers with a higher education level had higher scores ($M = 2.49$, $SD = .8$), however, the results were not statistically different, $t(42) =$

-1.77, p = .085. This compliments the findings in the regression analysis where results for this interaction were close to statistical significance (p = .074). A third independent sample t test was conducted to better understand the direction of the relationship between education levels of teachers within the consultancy only group. Results from this test showed that within this interaction, teachers with a higher education level scored higher (M = 2.79, SD = .8) than teachers with a lower education level (M = 2.04, SD = .6) and results are statistically significant, $t(63)$ = -4.09, p = .000.

CHAPTER 5

CONCLUSION

Discussion

This study evaluated the extent to which teacher education level, teacher age, and years working in their current program influenced the effectiveness of a professional development intervention in relation to classroom quality in an early childhood setting. Overall, none of the treatment groups showed significance in relation to CLASS scores across each of the three domains when data were analyzed without any interaction terms. The initial inclusion of teacher characteristics in the regression analyses did not change the direction of the relationship between the intervention groups and scores. The inclusion of interaction terms in the analyses did result in changes in both significance and directions of relationships across the three domains. Teacher age and teacher education levels and intervention groups had significant interactions within each of the domains, whereas teacher experience did not.

Emotional Support is one aspect of classroom quality. It measures the quality of teacher – child relationships based on teacher awareness of each child as well as teacher responsiveness to a child's social emotional needs. Analytic results in this domain showed teacher age and teacher education interacted with treatment status to influence classroom quality. Initially, teacher age was found to be negatively correlated with Emotional Support CLASS scores, however this correlation becomes

positive when interaction terms are added. Thus, while older teachers score better in this domain, exposure to professional development helped the younger teachers more than the older teachers. This happens at a statistically significant level when teachers receive both the course and the consultancy. One possible explanation for this could be generational difference. Younger teachers are new to the field and may be more open to the evolved best practice ideas that foster emotional growth in early childhood. Older teachers may be more accustomed to different strategies of building teacher – child relationships due to their own childhood experiences. These experiences involve both personal experiences as well as developed teaching philosophies. Younger teachers are possibly still in a stage of developing the teacher mindset because they have less post schooling experiences. As a result, older teachers may have a more difficult time adapting to the teaching skills being taught and encouraged through the professional development. While younger teachers had higher scores as compared to older teachers for each of the three treatment groups, younger teachers benefitted most from the course and consultancy exposure. The little literature that is available does allude to the fact that younger teachers are more likely to pay mind to individual child characteristics (Mullola et al., 2011). More specifically, younger teachers may be more likely to take into consideration child temperament when evaluating child achievement. In relation to classroom quality, if teachers assess individual temperament, they are then able to build a teacher – child relationship based on the child as an individual which will in turn impact their teaching and classroom management. More research where age is the main focus may

provide a more detailed understanding of how teacher age influences classroom quality.

Emotional support scores significantly differed between education levels for participants in the consultancy group. Teachers with higher than a bachelor's degree who were a part of the consultancy group scored higher than teachers with lower than a bachelor's degree. It is known from the literature that teacher collaboration provides social interaction and opportunity for feedback (DeMonte, 2013). Teachers with higher education levels may be more accustomed to this setting as a result of college courses and student teaching opportunities. While the course only and the course and consultancy groups did not result in statistical significance, mean scores for teachers with higher education levels were higher than those with lower education levels. This finding agrees with research that teachers with higher degrees may have more knowledge of academic based teaching (Torquati et al., 2007). Professional development that involves a consultancy component has the greatest influence on increasing emotional support within the classroom (Johnson et al., 2017) and teachers with higher education levels appear to benefit more than their counterparts. Similar connections exist for other classroom quality domains.

The second component of classroom quality measured in the study was Classroom Organization. Within this domain, effectiveness of behavior management skills and efficient layout of learning time was measured. Surprisingly, no significance was discovered between the treatment groups and this domain of classroom quality.

Prior to introducing the interaction terms, teacher age had a negative and statistically significant, $p < .05$, correlation to Classroom Organization CLASS scores.

However, this relationship changed when interaction terms were accounted for. Research thus far has not shown that teacher age is a predictor of classroom quality (LoCasale-Crouch et al., 2007; Kesner, 2000) and the current study partially supports that. The addition of interaction terms between teacher age and each of the three treatment groups negated the influence of teacher age. The shift in significance that appeared in the regression suggests that there are other factors that are interacting with age. To better understand the influence of age on classroom, more research on teacher age that accounts for other factors as well is necessary.

The consultancy and education level interaction term is the only variable that is significantly correlated to Classroom Organization CLASS scores. Teachers in the consultancy group with a bachelor's degree or higher had statistically significant higher scores than teachers in this group with lower education levels. The relationship between consultancy group and Classroom Organization went from positive to negative once the interaction variable were added indicating that teacher education as a predictor of Classroom Organization CLASS scores functions better when evaluated based on intervention group. Similar to Emotional Support, this is supported by the research showing the positive influence that consultancy practices have on classroom quality (DeMonte, 2013; Johnson, 2017; Son et al., 2015). One explanation for why teachers with higher education levels benefit most here could be their exposure to preservice teaching experience where collaboration and feedback occur. The basic open systems model previously discussed supports the importance of the feedback loop. Teachers who have experienced this type of learning may respond better to it.

Further investigation of consultancy based training and the educational background of teachers may provide a deeper understanding of this relationship.

Interestingly, the interaction between receiving the course and the consultancy and education level did not significantly predict Classroom Organization. It could be expected that if the consultancy group interacted with the education level than so would the course and the consultancy. As the research shows, both types of professional development are useful for teachers. Johnson and colleagues (2017) provided two 1.5 hour sessions educating teachers followed by a seven week, peer coaching program. Data analysis for this study used the same scoring system as the current study. At the completion of the study there was an increase in emotional support CLASS scores. About 58% of the teachers in this study reported having a bachelor's degree or higher, but results did not test for variation by education level (Johnson et al., 2017). Results from the analysis in the current study contradict some of the existing research.

The third domain that makes up classroom quality is Instructional Support. This domain measures quality based on delivery of concepts, fostering communication interactions, promoting thinking skills, and providing feedback to children during learning experiences. The Instructional Support domain is the only domain of the three where significance between at least one of the treatment groups and Instructional Support CLASS scores exists once moderating and interacting variables are included. More specifically, the consultancy group was a significant predictor in both model 2 and model 3, and the course and consultancy group was significant in model 3. Also, there is a positive relationship between having a higher education level and

Instructional Support CLASS scores. This knowledge, paired with results from all three interaction terms between treatment groups and having a higher level of education, directly connects to the existing literature. Higher math skills (Peisner-Feinberg et al., 2001) and higher early reading skills (Son et al., 2013) have been observed for children who are in classrooms with teachers who have at least a bachelor's degree. The higher quality teaching suggests that teachers with a bachelor's degree or higher have a deeper understanding of what it takes to create a rich learning environment. The current study shows that the teachers with higher education levels benefit from each of the three treatment combinations which may be a result of their preexisting ability to foster a stronger learning environment than those who have lower credentials.

Throughout the literature, higher teacher education level was commonly associated with increased teaching and instructional skills (Johnson et al., 2017). The current study shows higher CLASS scores for teachers with a bachelor's degree or higher in the Instructional Support prior to the domain when the treatment groups interact with teacher education levels. When interaction terms are added, the relationship between having a bachelor's degree or higher and Instructional Support CLASS scores becomes negative, suggesting that education level on its own is not actually a strong a predictor, rather it is education interacting with professional development interventions. Exposure to professional development may be more effective for teachers who have a bachelor's degree or higher. Interestingly enough, this contradicts the findings of Johnson and colleagues (2017) who found that consultancy practices did not influence instructional skills.

Overall, results from each of the three domains suggest that education level appears to play a very strong role in predicting classroom quality. While there is some truth to this, deeper investigation suggests that it is not education alone, as the research suggests. It is the interaction of teacher education paired with professional development that increases the quality of the classroom environment. In contrast, teacher age proved to be influential only for emotional support. The Emotional Support domain has a heavier focus on the relationship between the teacher and child. The Classroom Organization and Instructional Support domains are more geared towards learning structures. The Basic Open Systems Model within Dynamic Systems Theory says that input, environment, and feedback all influence throughput. The environment piece looks different for younger teachers than it does for older teachers. Generational differences may exist in relation to how teachers bond or connect with young children. The measurement of emotional support within the classroom may be more relatable to younger teachers whereas older teachers may be more set in their ways. Due to this possible explanation, feedback from the professional development may be more difficult for older teachers to relate to in comparison to younger teachers.

Teacher experience did not show significance in any domain of the study. Data collected for this study asked teachers to report the number of years that they have been working in their current program which may contribute to the lack of significance because it does not capture experience that a teacher may have from previous jobs. High teacher turnover rates (Saluja, Early, & Clifford, 2002) contribute to the experience variable because teachers who leave one school for another are still expanding on their experience. Measuring experience based on number of years

working in their current position does not give weight to any experience that occurred prior to their current position. Additionally, teacher experience and teacher age were closely correlated ($r = .31$, $p < .001$). Teacher age was entered into the regression prior to teacher experience, therefore any shared variance measured may have been assigned to the teacher age variable. Therefore, it can be assumed that the trends seen in teacher age data are similar to what is expected for the number of years that a teacher has been working in their program.

The course component of the current study did not prove to be significant on its own within any domain of classroom quality. This finding contradicts the research of Gropen and colleagues (2017) who found that coursework resulted in improving teaching science concepts and teaching inquiry skills within an early childhood setting. As many professional development trainings are offered in seminar or course layouts, more research is needed to determine consistent benefits of this form of professional development.

Limitations

Addressing limitations is an important piece of a research study, as limitations exist in every study. Secondary data were used which led to many of the limitations that will be discussed. Analyses in the current study were conducted by manipulating existing variables rather than collecting data based on the research question. Additionally, secondary data were collected in schools determined by the researchers in the Teacher Professional Development Study and the data are about ten years old. As a result, the sample is comprised of teachers in more urban settings (Pianta et al.,

2017) which may not be generalizable to non-urban school settings. More research would be needed to better evaluate how data vary by school setting.

One limitation to the data collected is that the total number of years that a teacher has been working in the early childhood education field was not measured. The overall number of years that a teacher has been working in the field may be different from the number of years that they have been in their current program. Experience builds over time and it would be interesting to observe how the analyses change with the incorporation of total number of years teaching in the early childhood field.

In relation to variable measurement, teacher education was recoded into a dichotomous variable as a result of the sample size. With a sample size of 210 teachers, pairing four education levels with the four treatment groups could impact the effect size within the study. Based on the significance found when evaluating education level, follow up research for this study should include four levels of teacher education level (high school diploma, associate's degree, bachelor's degree, master's degree or higher) to see how professional development influences classroom quality.

Another limitation to the study is that this professional development targets solely language and literacy development. Teacher response to professional development with a different focus may result in different outcomes. The complexity of professional development complicates looking at the impact of professional development on classroom quality.

Lastly, the initial sample size in the dataset is 401 teachers. Due to missing data and teacher attrition, the final sample size is 210 teachers. Teacher attrition was

due to geographic relocation of the teacher, changing occupations, or changing classrooms which made them ineligible to continue (Pianta et al., 2017). These factors combined reduced the sample size by about 50% and the drop in sample size limits the power of the study to find effects.

Conclusion

High classroom quality in early childhood settings has been found to be beneficial for the long term development of children and child success (Peisner-Feinberg et al., 2001). The current study evaluated factors that moderated how professional development influenced classroom quality and revealed that professional development on its own showed significance only in the Instructional Support domain. However, teacher education level and professional development interacted consistently to influence Emotional Support, Classroom Organization, and Instructional Support domains. The interactions showed that the language and literacy professional development when delivered through consultancy was consistently more beneficial for teachers with a bachelor's degree or higher.

The literature notes that the most impactful professional development interacts with the classroom setting during the time frame in which teachers are being exposed to the training (DeMonte, 2013). The consultancy component of this training did just that. Teachers met with their trained consultant every two weeks and evaluated, in a purely observational manner, teaching strategies being used and how to improve areas needing support. The course alone was not beneficial in relation to classroom quality, suggesting that this interaction and feedback aspect, as supported by Dynamic Systems Theory, is important.

Evaluating teaching characteristics provides the knowledge that teachers respond differently to professional development based on who they are as an individual. For example, it may be beneficial to encourage older teachers to seek out course based professional development experiences in order to explore and understand new teaching strategies prior to being immersed in a consultancy or mentorship based program. The current study suggests that teachers with a bachelor's degree or higher benefit most from ongoing professional development that includes reflecting on teaching strategies used in the classroom paired with feedback from a trained consultant. Based on the current study, there is no single professional development structure that is a best fit for teachers who do not have a bachelor's degree. Teachers who do not have at least a bachelor's degree should continue to participate in available professional development in an effort to expand their knowledge in the field and grow as a professional.

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