

Parent Play Beliefs, Play as a Teaching Technique, and Teachers' Pedagogical Knowledge, and Children's Early Numeracy and Literacy Skills: Evidence from Wolaita Zone, Southern Ethiopia

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Abstract

This study examined the associations between parent play beliefs, play as a teaching technique, teachers' pedagogical knowledge, and early numeracy and literacy skills in six-year-old children who attend preschool education. A correlation study design, under a quantitative approach, was used. Participants included 216 children (106 male and 110 female), 215 teachers (99 male and 116 female), and 210 parents (135 male and 75 female). The Parent Play Beliefs Scale, preschool teachers' pedagogical content knowledge scale, and literacy and numeracy test were used. Hierarchical linear modeling results showed that the parent play beliefs, play as a teaching technique, and teachers' pedagogical knowledge of ΔR^2 value of 0.020 revealed a 0.2% change in the variance of models 1, 2 and 3 with $\Delta F(1, 213) = 17.679, p < 0.001$. Analyses revealed that the combined effects of the independent variables explained a 76.4% variance in children's early literacy and numeracy. These findings indicate that the variables significantly and positively predicted children's literacy and numeracy skills. Eventually, in conclusion, areas of further research and implications for policy and practice were forwarded based on the major findings.

Keywords

Literacy, Numeracy, Parent Play Beliefs, Pedagogical Knowledge, Play

1. Introduction

On November 4, 2015, 184 UNESCO member states in Paris endorsed the Education 2030 Framework for Action. It is the product of a collaborative effort comprising in-depth, wide-ranging dialogues led and controlled by countries, with UNESCO and other partners facilitating the process. The Education for All (EFA) steering committee, convened by UNESCO, led the creation of the framework, which was finalized by the Education 2030 Framework for Action drafting group (The World Education Forum 2015 was organized by UNESCO in collaboration with UNICEF, the World Bank, UNFPA, UNDP, UN Women, and UNHCR.). By 2030, governments must “assure that all girls and boys have access to quality early childhood development, care, and pre-primary education so that children are ready for primary education,” as stated in Sustainable Development Goal 4 (SDG 4).

Early childhood is now more than ever before in the worldwide limelight. Several lines of study have come together to make a strong case for prioritizing policy and service development in this area. Research shows that a child’s first years are a critical time for biological, neurological, psychological, social, and emotional growth and change; that poverty and other disadvantages can affect a child’s “developmental potential” in a variety of ways (some of which are irreversible); and that well-planned early interventions can have long-term positive outcomes for children (Unicef, Un, & Matas, 2018).

High-quality early education promotes beneficial development in a variety of areas throughout a person’s life and lays the groundwork for subsequent academic success (Barnett & Frede, 2010; Gunn et al., 2013). “The most crucial part of quality in preschool education is teacher-child interactions” (Gunn et al., 2013). As a result, we must comprehend the teacher-level characteristics that contribute to meaningful connections. One such aspect is Pedagogical Content Knowledge, a unique knowledge base for education, which is a key compo of net of interest and one such factor that is relevant to children’s outcomes (Kanter & Konstantinopolous, 2010; McCray & Chen, 2012; Munck, 2007).

Early childhood educators require a distinct knowledge foundation from primary and secondary school teachers (Zhang, 2015). One of the predictors of learning success is early childhood teachers’ pedagogical knowledge (Figueiredo et al., 2018). The competence of teachers, material, methods, learning strategies, the suitability of lessons with the level of child development, and the environment designed by teachers so that the children can explore are all factors that affect the success of early childhood education, according to (Inan, 2010; Dejonckheere et al., 2016). All of these elements are included in the pedagogical content knowledge components (Aksu & Kul, 2017; Inan, 2010; Zhang, 2015).

Pedagogical Content Knowledge is defined as a teacher’s ability to know his or her students well, to employ the essential pedagogical strategies, and to master Content Knowledge in the teaching-learning process (Shulman, 1987). Many aspects are discussed in the success of early childhood education, including the

teachers, environment, materials, teaching methods and approaches, appropriate timing, and subject fit to the child's developmental level. All of these factors have been integrated into one idea called Pedagogical Content Knowledge. Pedagogical Content Knowledge necessitates that the teacher, not only masters his or her domain but also has sufficient pedagogical knowledge in transferring that knowledge to the child; additionally, studies have shown that Content Knowledge and Pedagogical Content Knowledge are closely related (Usak, 2009; Ozden, 2008).

PCK (Pedagogical Content Knowledge) is a concept that has been commonly used in teacher knowledge literature to represent teachers' professional knowledge (Fernandez, 2014). According to Newsome et al. (2019), the point of PCK is how the subject matter is changed for teaching, which occurs when educators interpret the subject matter and find different ways to represent and make it accessible to students based on the context of the material, learning theme, or field of study. According to the findings of the component connection study, each component has various interactions (Park & Chen, 2012; Suh & Park, 2017). It is influenced by research participants' inherent characteristics, such as the teachers' educational backgrounds, teaching experience(s), and field of study (Fernandez, 2014; Lee, 2017). The interaction between PCK components is also the foundation for the ever-evolving PCK components, and it requires ongoing development. Orientation to Teaching (OT), Knowledge of ECE Subject Matter (KESM), Knowledge of Student Understanding in Learning (KSU), Knowledge of ECE Curriculum (KEC), Knowledge of Context (KofC), Knowledge of ECE Assessment (KAE), and Knowledge of Instructional Strategies for Teaching (KIST) is among the PCK components (Park & Chen, 2012).

Early childhood learns through playing, observing simple concepts, and using these to construct more complicated ideas and concrete and literal information, according to Dodge & Colker (2001); Chou et al. (2014). This has an impact on the establishment of distinctive learning in kindergarten. According to Bautista et al. (2016), the features of kindergarten teaching include 1) a holistic approach to growth and learning, 2) integrative and interactive learning, 3) children as inquiring, active, and competent students, and 4) adults as learning supporters.

Play is an important part of children's development in kindergarten (Graue, 2009; Miller & Almon, 2009). Teachers are reducing the number of play-centered activities in kindergarten classrooms as a result of mandates such as "No Child Left Behind" (Lee et al., 2006) and pressure to satisfy state and national standards. However, for children's growth, it is critical to include play in the curriculum. "The traditional kindergarten classroom that most adults remember from childhood with plenty of space and time for unstructured play and discovery, art and music, developing social skills, and learning to enjoy learning has virtually disappeared" (Miller & Almon, 2009).

The importance of play in an adequate early development classroom cannot be overstated. Over the last decade, research on the benefits of children learning through play has increased. Playing facilitates many social, cognitive, physical, and linguistic gains, according to research (Eberle, 2011; Fisher et al., 2012). Child-

ren that engage in social play grow more imaginative and adept at verbally explaining the meaning, as well as more successful at using different symbol systems and more confident when trying out new activities (Bjorklund & Gardiner, 2011; Eberle, 2011; Pellegrini, 2011). Teachers gently guide play in school settings, utilizing play-based teaching and learning activities to achieve curricular goals while preserving fundamental components of play, such as children's natural motivation to engage in play (Bodrova, Germeroth, & Leong, 2013; Eberle, 2011).

Much has been published about play's cognitive, social, emotional, and language benefits, as well as the different types and stages of play that occur in early childhood classrooms. Play is an important aspect of early childhood education, according to the Association for Childhood Education International (ACEI) and the National Association for the Education of Young Children (NAEYC) (Bredenkamp & Copple, 2009). Children's play is described as optimal learning times by Piaget's (cognitive and physical development) and Vygotsky's (socio-cultural experiences) theories (Elkind, 2004). Play is also important throughout the vital stages of brain development during the preschool years, according to a study (Healy, 2004). The language encourages symbolic thinking in play and is seen as a vehicle for the development of self-control, cognition, and social skills (Bredenkamp & Copple, 2009).

Teachers, on the other hand, may overlook the importance of play in children's growth. "Play is beneficial and, in fact, critical for helping children accomplish important social, emotional, and cognitive developmental milestones as well as helping them manage stress and become resilient" (Kekesi et al., 2019). As a result, it is vital for kindergarten teachers to recognize the value of play in improving stress management and social skills, as well as to feel confident in incorporating play-based learning activities into their classroom instruction (Ashiabi, 2007).

The beliefs of the parents have a significant impact on how their children play and learn at home and in school. Their beliefs about their children's education most likely differ substantially depending on a variety of circumstances, including their cultural backgrounds, and it has been demonstrated that these beliefs are related to the social and developmental outcomes of children (Hyun et al., 2021). There are gaps in our understanding of the underlying beliefs that parents hold about their children's play, even though some research has examined the cultural variances in beliefs about the play (Roopnarine, 2011). This is significant because parental beliefs may influence how much free play, dyadic play, and interactive peer play are encouraged (or discouraged) for preschoolers.

Research on a variety of samples has shown that parents' beliefs have a considerable impact on their children's developing peer social competence during early childhood (LaForett & Mendez, 2016a). More precisely, prior research reveals that parents' beliefs on children's play affect how much they encourage play activities at home, how these play activities are set up, and how much of a part parents have in their child's play (LaForett & Mendez, 2016a). When parents appreciate playing as a learning opportunity and have positive attitudes to-

ward play, they provide their kids the time and space to play with their friends at home and school (Bulotsky-Shearer, McWayne, Mendez, & Manz, 2016). Several studies have explored play beliefs in various racial/ethnic groups, including Latinos (LaForett & Mendez, 2016b), utilizing the Parent Play Beliefs Scale (PPBS; Fogle & Mendez, 2006).

The two key areas of early academic achievement in children are reading and mathematics. These two domains are crucial for knowledge acquisition in other domains, in addition to being significant on their own (Purpura et al., 2011). These two domains are connected from very early ages (Bierman & Nelson, 2010) and are long-term indicators of one another (Duncan et al., 2007).

The development of reading proficiency has been demonstrated to be influenced by abilities that are formed before formal instruction, even though the majority of children do not typically receive official instruction in reading until they are in kindergarten or the first grade. Early literacy skills are the reading and writing abilities, information, and attitudes that emerge before formal education (Whitehurst & Lonigan, 1998). Oral language, phonological processing skills, and print knowledge are the three essential early literacy skills (Purpura et al., 2011).

Children start to develop their mathematical abilities at an early age, much like they do with reading. According to some research, children already possess some informal mathematics skills at birth, such as the capacity to distinguish magnitude changes (Wood & Spelke, 2005). Children gain this informal knowledge when they explore the natural world, but it can also be enhanced through education (Baroody, Eiland, & Thompson, 2009; Purpura et al., 2011). Numbering, numerical relations, and arithmetic operations are the three strongly connected but separate categories that make up the evaluation of preschoolers' early numeracy skills (Purpura et al., 2011).

According to Duncan et al. (2007) and Purpura et al. (2011), reading and mathematics skills are related across time, and children who struggle in one area are more likely to struggle in the other (Barbarese, Katusic, Colligan, Weaver, & Jacobsen, 2005). According to Fuchs et al. (2006), correlations between math and reading scores typically average around .60 in elementary school and adolescence and can even be higher in preschool (Welsh et al., 2010). Additionally, even in middle and high school, early math and reading abilities predict one another over time (Hooper, Roberts, Sideris, Burchinal, & Zeisel, 2010).

Results showed that the program improved children's ability in utilizing, a fundamental early arithmetic concept, and strengthened parents' beliefs that math was important for young children. It also raised parents' engagement in math activities with their kids (especially when they were participating in the program). Parents' math self-efficacy, children's ability levels in other math domains, or parent and child outcomes unrelated to arithmetic were not significantly affected by the program (Holtzman et al., 2023).

In Ethiopia, preschool programs, also known as pre-primary education, are given in three ways. Kindergarten is mostly run by nongovernmental organizations (NGOs), communities, private institutions, and faith-based organizations.

The second, non-formal preschool program is mostly provided by child-to-child initiatives. The third and most common response of municipal governments has been the establishment of the O-class. This study was focused on kindergarten school children in Wolaita Zone, southern Ethiopia who were aged 6 on September 30, 2021.

To summarize, despite the progress towards EFA goals in Ethiopia, the researcher wanted to measure children's early literacy and numeracy skills. Early childhood teachers with solid pedagogical knowledge intend to employ play as a teaching approach. Depending on their knowledge of the play, kindergarten teachers could also employ play as a teaching strategy. Their pedagogical content knowledge and parents' belief towards play in the internal and external teaching environment could either positively or negatively influence the quality of pre-primary education, according to different research findings.

Statement of the Problem

Preschool Education (PSE) in Ethiopia is currently lacking in terms of quality, relevance, and equity (Fantahun, 2016). Educational reform in Ethiopia, according to Fantahun (2016), should focus on correcting gaps such as educational philosophies, policy contexts, appropriateness of contents, and methodological approaches. Furthermore, many preschool instructors are underqualified for the age group they are required to teach, and some qualified teachers are not evenly distributed throughout regions (Aschalew, 2018). In Ethiopia, the quality and relevance of preschool teacher preparation programs are a key challenge (Rossiter, 2016).

The importance of well-trained teachers in preschool education is paramount important. For decades, however, Ethiopian preschool teacher has received insufficient attention. There are now sporadic initiatives to provide trained teachers to preschool schools. However, the number of research studies looking at the quality of preschool teachers' pedagogical content knowledge is minimal (Abrha, 2019). Similarly, Ethiopian government interventions and funding for this program are minimal (Aschalew, 2018).

Following that, previous pedagogical content knowledge research on kindergarten teachers produced several analyses, including 1) it only focused on individual components (Dewi et al., 2020; Lee, 2010; Lee, 2017); 2) it also focused on mathematics (Dağlı & Dağlıoğlu, 2021; Lee, 2010; Lee, 2017; McCray & Chen, 2012); and 3) it also focused on language (Jordan et al., 2018) and psychosocial (Kankam & Abroampa, 2015). None of these studies describe the interplay between kindergarten teachers' pedagogical content knowledge components, parents' play beliefs, the use of play as a teaching strategy, and children's early literacy and numeracy skills.

Success in school and beyond depends on having strong mathematical knowledge and abilities. Although there has been an increase in professional interest in the role parents play in young children's math development, there is still a lack of thorough research on the subject, particularly for children under the age of six and when compared to research on parents' influence on literacy development (Holtzman et al., 2023). This study used a correlational research design

to examine whether teachers' pedagogical knowledge, play as a teaching technique, and parents' ideas and beliefs about play, reading, math, and children's learning outcomes were correlated.

As a result, the current study uses this unique environment to examine parental beliefs about how play encourages learning in young children. Regarding early reading and numeracy outcomes for children, the researcher specifically examines these play beliefs in light of teachers' pedagogical knowledge and play as a teaching strategy. In both the home and preschool context, an existing parent report measure of play beliefs is being used to see these beliefs to children's learning outcomes.

A visit to some kindergarten schools in the study area by the researchers indicated that the play seems to be on the lower side as far as teaching and learning were concerned. It was observed in eleven schools visited that most of the kindergarten schools seem not to have enough knowledge, or full control over play activities and use play as a teaching technique. Common among them was, young children are most often allowed to go out for free play with little or no guidance or supervision. Lack of early childhood services (educational input), grade repetition, drop-out rates, lack of awareness among parents, teachers' competence, and physical environment accessibility challenges were observed. It is, therefore, necessary to assess and explore the pedagogical knowledge of kindergarten teachers and challenges in the Wolaita Zone on the relationship between the uses of play as a teaching technique.

Having stated the above gaps, in this study, the researchers make an effort to document the roles of parent play beliefs, play as a teaching technique, and teachers' pedagogical knowledge to children's early numeracy and literacy skills in pre-primary schools. To this end, the following research questions would be examined in the course of the study to address the problem.

- 1) What is the level of kindergarten teachers' pedagogical content knowledge?
- 2) What is the relationship between parent play beliefs, play as a teaching technique, teachers' pedagogical knowledge, and children's early numeracy and literacy skills?
- 3) To what extent do the parent play beliefs, play as a teaching technique, and teachers' pedagogical knowledge contribute to children's early numeracy and literacy skills?
- 4) Which of these variables are relatively significant factors that predict children's early literacy and numeracy skills?

The main purpose of this study was to assess the early childhood care education of Kindergarten education in the Wolaita Zone: focusing on parents' play beliefs, teachers' pedagogical knowledge, play as a teaching technique, and early literacy.

2. Materials and Methods

In this study, the contribution of teachers' pedagogical knowledge, parent play

beliefs, and play as a teaching technique to children's early numeracy and literacy skills was examined in six-year-old children who attend preschool education, a correlation study designed, under a quantitative approach that attempted to explore the key variables which predict children early numeracy and literacy skills. Teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique were classified as independent variables, and children's early numeracy and literacy skills were considered dependent variables. The populations for the selected areas of this study were 1428 preschool teachers in the Wolaita zone in the academic year 2020/21. Of these 712 (49%) were males and 716 (51%) were females.

Wolaita Zone is organized into 16 rural Woredas and 6 reform towns. Schools are geographically dispersed to different corners. As a result, the researcher decided to use the largest 2 Woredas and 1 town administration, namely Humbo, Sodo town, and Ofa through a purposive sampling technique. The population of selected Woredas and town administration was 505. While the participation of all populations in a study is impossible, determining sample size critical issue in the process of research. Due to this 219 teachers were selected based on the Sample Size Determination Using Krejcie and Morgan Table. The ever-increasing need for a representative statistical sample in empirical research has created the demand for an effective method of determining sample size (KENPRO, n.d.).

219 children and 219 parents were selected using purposive sampling techniques considering the parents' ability to read and write. In purposeful sampling, researchers intentionally select individuals and sites to learn or understand the central phenomenon. The standard used in choosing participants and sites is whether they are "information rich" (Patton, 1990).

The major methodological concern of the research was quantitative analysis and the interpretation of the responses to the given questionnaires, about the theoretical and practical framework of ECE education. The analysis and interpretation mainly emphasized the current practices and contribution of teachers' pedagogical knowledge, parents' play beliefs, and play as a teaching technique for children's numeracy and literacy skills.

Preschool teachers' pedagogical content knowledge tools would be used in this study (Nilsson & Loughran 2012). There were two sections in the questionnaire: "A" and "B". The focus of section "A" was background information (such as gender, years in the current school, teaching experience, and so on). Section "B" was composed of items that were scored on a 5-point Likert scale as follows: Strongly Agree (SA) = 5, Agree (A) = 4, Undecided (UD) = 3, Disagree (D) = 2, and Strongly Disagree (SD) = 1. Data collection on playing as a teaching strategy would be guided by self-developed questionnaires that were based on literature.

The researcher employed the Parent Play Beliefs Scale (PPBS) manual and scoring guide (Fogle & Mendez, 2006). Due to their economic disadvantage, African American mothers and other female caregivers are frequently the subjects of preventative and intervention initiatives. The PPBS was developed and validated

utilizing a sample of these understudied individuals (Mendez, Fantuzzo, & Cicchetti, 2002). The PPBS is a 30-item parent questionnaire that was scored on a scale of 1 (disagree) to 5 (strongly agree) (strongly agree).

The Tanzania Literacy and Numeracy Test (*Uwezo Tanzania, 2013*), the EGRA and EGMA Assessments in Ethiopia, and other assessments on early literacy and numeracy skills were modified by the researcher. The tests were designed to evaluate the readiness of upper KG students for formal education and their mastery of fundamental skills. Before customizing and choosing instruments, the researcher also checked upper KG textbooks for English, Mathematics, and other topics. Both the validated and pilot-tested test questions for the two competencies. In the validity of the instruments section, the psychometric qualities of these items were discussed in detail.

Face validity of the instrument would be established by giving the prepared instrument to the experts in the field. The content validity of the instruments was assured by experts in early childhood education departments, and their comments would be incorporated. For reliability check, the questionnaire was a pilot test on preschool teachers, outside the setting of the main study and Cronbach's alpha reliability coefficient would be calculated. The reliability coefficient of teachers' pedagogical knowledge was (0.86), parent play beliefs (0.78), play as a teaching technique (0.79), and children's early numeracy and literacy skills (0.74) respectively.

Pre-data collecting procedures begin with obtaining a formal permission letter from the heads of departments to contact the teachers while the class was in session. This study employed seven research assistants. Giving training on ethics and human subject protection, confidentiality, informed consent procedures and use of the informed consent instrument, familiarity with each data collection instrument, monitoring each instrument as it is completed to intercept missing data, and when/where to drop off completed forms to the lead researcher on how to collect data from respective participants.

The researcher explained the study's purpose, and client and researcher responsibilities, and presented a consent form to the participants. The participants then sign an informed consent form to participate in the study. After receiving permission from each instructor, the questionnaire would be distributed to the teachers. The study's data was kept safe by qualified data collectors.

This study takes into account important ethical considerations, such as participant permission and confidentiality. Furthermore, the researchers were aware of the study's goal and that the participants' responses would only be utilized for research purposes. In no portion of the research would any of the data collected be customized. The problem of confidentiality was ensured, and they were informed that the data collecting forms only have the participant number, and no names, and were stored sequentially by participant number.

Before analyzing the acquired data, effective data entry chores would be completed, followed by analysis duties using SPSS Windows 26. Following the data collection, descriptive and inferential statistics would be utilized to analyze the

data in this study to answer the research questions. Descriptive statistics would compute predictor and criterion variables. Furthermore, the same techniques were used to describe the level of school readiness. The statistical analyses would be conducted based on the basic research questions that the study aimed to answer. Correlation matrices were employed depending on the nature of the data and research questions. All the predictor variables would separately be checked with the criterion variables for their possible association with standard multiple regression and all of the predictor variables were entered in the hierarchical regression analysis to test their combined association with the criterion variable and those variables with p -value < 0.05 select as possible predictor variables in the study.

The child's scores on different tasks are averaged or summed up to produce an overall or percent accurate score. This result was later transformed into a z-score, which provides a uniform score for each action that can be totaled up to create a final domain-level result. This approach prevents tasks with a lot of parts from being assigned a larger weight by ensuring that each task contributes equally to the domain-level calculation.

3. Results

In this chapter, the data analyses and findings were reported. Thus, this chapter deals with the presentation of the findings in various forms with their analyses in detail. In addition to this, it consists of the interpretation of the analysis derived from the findings. The data obtained through a questionnaire and direct assessment were analyzed under the quantitative data analyses section.

As shown in **Table 1**, the questionnaire was conducted by 219 teachers and

Table 1. Characteristics of respondents.

	Male	Female	Total	Percent
Teachers				
Issued questionnaire	101	118	219	100
Answered questionnaire	99	116	215	98.2
Unanswered questionnaire	2	2	4	1.8
Parents				
Issued questionnaire	141	78	219	100
Answered questionnaire	135	75	210	95.9
Unanswered questionnaire	6	3	9	4.1
Children's				
Issued direct assessment	108	111	219	100
Participated in the direct assessment	106	110	216	98.6
Missed the direct assessment	2	1	3	1.4

219 parents while the direct assessment was conducted by 219 children. The analysis was made using 215 teachers, 210 parents, and 216 children and the remaining participants missed the questionnaire or direct assessment.

Table 2 showed that among the three independent variables that predict children's early numeracy and literacy skills, (teacher pedagogical knowledge) shared the highest mean score among the participants of the study with ($M = 3.38$, $SD = 1.5$), followed by the mean score of play as teaching technique with ($M = 3.1$, $SD = 0.99$). **Table 2** also showed that parents play belief results shared a mean score ($M = 2.91$, $SD = 0.98$). The results indicated in the descriptive table above clearly revealed that teacher pedagogical knowledge was greater than the other variables that predict children's early numeracy and literacy skills.

Table 3 revealed that teachers' pedagogical knowledge, play as a teaching technique and parent play beliefs have a significant positive and strong correlation with children's early numeracy and literacy skills ($r = 0.65$, $p < 0.01$, $r = 0.84$, $p < 0.01$ and $r = 0.83$, $p < 0.01$).

Table 4 shows the effect of teachers' pedagogical knowledge, the parent plays beliefs, and play as a teaching technique on children's early numeracy and literacy skills. The R^2 value of 0.71 revealed that the predictor variable explained 71% variance in the outcome variable with $F(1, 215) = 526.00$, $p < 0.001$. The R^2 value of 0.745 revealed that the predictor variable explained a 74.5% variance in the outcome variable with $F(2, 214) = 311.82$, $p < 0.001$. The R^2 value of 0.764 revealed that the predictor variable explained 76.4% variance in the outcome variable with $F(3, 213) = 229.98$, $p < 0.001$ for teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique respectively.

Table 2. Descriptive statistics.

	N	Range	Minimum	Maximum	Mean	Std. Deviation
NLS	217	2.94	-1.76	1.18	-0.0374	0.77210
TPK	217	6.12	0.41	6.53	3.3810	1.49408
PPB	217	4.00	0.53	4.53	2.9155	0.98033
PTT	217	3.93	0.93	4.87	3.1054	0.99648
Valid N (listwise)	217					

Table 3. Correlation matrix.

	1	2	3	4
Numeracy & literacy skills	1			
Teachers pedagogical knowledge	0.649**	1		
Play as a teaching technique	0.843**	0.593**	1	
Parents play beliefs	0.835**	0.613**	0.897**	1

Table 4. The effect of teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique contributes to children's early numeracy and literacy skills

Variable	R	R Square	Adjusted R Square	The error in the Estimate	F value	Sig.
Teachers' Pedagogical Knowledge (TPK)	0.843 ^a	0.710	0.709	0.416	526.00	0.000
Parent Play Beliefs (PPB)	0.863 ^b	0.745	0.742	0.39207	29.044	0.000
Play as a Teaching Technique (PTT)	0.874 ^c	0.764	0.761	0.37763	17.679	0.000

^aPredictors: (Constant), PTT; ^bPredictors: (Constant), PTT, TPK; ^cPredictors: (Constant), PTT, TPK, PPB; ^dDependent Variable: NLS.

Table 5. The combined effect of teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique contributes to children's early numeracy and literacy skills

Variable	R	R Square	Adjusted R Square	The error in the Estimate	F value	Sig.
Teachers' Pedagogical Knowledge (TPK), Parent Play Beliefs (PPB), and Play as a Teaching Technique (PTT)	0.874 ^a	0.764	0.761	0.37763	229.98	0.000

Predictors: (Constant), PTT, TPK, PPB_a; Dependent Variable: NLS_b.

Table 5 shows the combined effects of teachers' pedagogical knowledge (TPK), Parent Play Beliefs (PPB), and Play as a Teaching Technique (PTT) on early numeracy and literacy skills. The R² value of 0.764 revealed that the predictor variable explained 76.4% variance in the outcome variable with F (3, 213) = 229.98, $p = 0.000$.

Table 6 shows the impact of teachers' pedagogical knowledge, the parent plays beliefs, and play as a teaching technique on children's early numeracy and literacy skills. In step 1, the R² value of 0.710 revealed that play as a teaching technique explained 71% variance in the children's early numeracy and literacy skills with F (1, 215) = 526.004, $p < 0.001$. The findings revealed that play as a teaching technique positively predicted children's early numeracy and literacy skills ($\beta = 0.843$, $p < 0.001$).

In step 2, the R² value of 0.745 revealed that play as a teaching technique and teachers' pedagogical knowledge explained a 74.5% variance in children's early numeracy and literacy skills with F (2, 214) = 311.83, $p < 0.001$. The findings revealed that play as a teaching technique ($\beta = 0.705$, $p < 0.001$) and teachers' pedagogical knowledge positively predicted children's early numeracy and literacy skills ($\beta = 0.231$, $p < 0.001$). The ΔR^2 value of 0.035 revealed a 0.35% change in the variance of model 1 and model 2 with $\Delta F (1, 214) = 29.044$, $p < 0.001$.

In step 3, the R² value of 0.764 revealed that play as a teaching technique, teachers' pedagogical knowledge, and parent play beliefs explained 76.4% variance in children's early numeracy and literacy skills with F (3, 213) = 229.98, p

Table 6. Hierarchical regression results for children's early literacy and numeracy skills.

Variable	<i>B</i>	95%CI		SE <i>B</i>	β	<i>R</i> ²	ΔR^2
		LL	UL				
Step 1						0.710	0.710***
Constant	-2.065	-2.248	-1.882	0.093			
PTT	0.653	0.597	0.709	0.028	0.843		
Step 2						0.745	0.035***
Constant	-2.139	-2.313	-1.965	0.088			
PTT	0.547	0.481	0.612	0.033	0.705		
TPK	0.119	0.076	0.163	0.022	0.231		
Step 3						0.764	0.020***
Constant	-2.170	-2.339	-2.002	0.085			
PTT	0.339	0.223	0.455	0.059	0.437		
TPK	0.098	0.055	0.142	0.022	0.190		
PPB	0.257	0.136	0.377	0.061	0.326		

Note CI = Confidence interval; LL = lower limit; UL = upper limit PTT = play as a teaching technique TPK = teachers pedagogical knowledge PPB = parent play beliefs. *** $p = 0.000$.

< 0.001. The findings revealed that play as a teaching technique ($\beta = 0.705$, $p < 0.001$), teachers' pedagogical knowledge ($\beta = 0.231$, $p < 0.001$), and parent play beliefs ($\beta = 0.326$, $p < 0.001$) positively predicted children's early numeracy and literacy skills. The ΔR^2 value of 0.020 revealed a 0.2% change in the variance of models 1, 2, and 3 with $\Delta F(1, 213) = 17.679$, $p < 0.001$.

4. Discussion

This study examined the relationship between teachers' pedagogical knowledge, parent plays beliefs, play as a teaching, and children's early numeracy and literacy skills under six years of age. The current investigation addressed four questions. The researcher measured the independent variables, the parent play beliefs scale (Fogle & Mendez, 2006), preschool teachers' pedagogical content knowledge scale (Nilsson & Loughran 2012), and literacy and numeracy test (Uwezo Tanzania, 2013) were used. In short, the evidence from this study suggests that teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique has a significant and positive correlation with children's early literacy and numeracy skills. Multiple regression analyses revealed that the combined effects of teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique explained 76.4% variance in children's early literacy and numeracy skills. Taken together, these findings indicate that teachers' pedagogical knowledge, parent play beliefs, and play as a teaching technique was the most significant and positive predictors of children's early literacy and numeracy skills.

For two decades, the Federal Democratic Republic of Ethiopia's Education and Training Policy has included the provision of Early Childhood Care and Education (ECCE) through a pre-primary stage focusing on the "all-round development of the child in preparation for formal schooling" (Addis Ababa, 1994). Initially, only very basic pre-primary education was offered in urban centers and certain rural areas, with the private sector providing the majority of it.

The Ethiopian government, through the Ministry of Education and Regional Education Bureaus, supported the large-scale implementation of pre-primary education in all areas of the country from 2010 to 2015, through a combination of government, community, nongovernmental (NGO), church, and private sector initiatives. Child-to-Child programs, multi-year kindergarten programs, accelerated school readiness courses, and a one-year O-class' reception' year are all available to students. Various studies are being conducted to determine the efficiency of these various approaches (Mundy et al., 2014).

Many studies (Darling-Hammond & Bransford, 2007) on teacher development researchers have found that four factors influence educational activities: teachers, children, environment, and teaching materials. Teachers' professional knowledge is the most important factor affecting young children's learning and an important predictor of teaching quality among the four. L. S. Shulman, L.S., and Grosman, P.L. proposed in 1988 (Shulman & Grosman, 1988) that there is a sort of knowledge specialized to teaching. They explained that pedagogical content knowledge (PCK) is the integration of subject knowledge and teaching knowledge by teachers during the teaching process. Hill et al. (2005) and Li & Ni (2006) found that teachers' PCK levels were positively correlated with students' academic achievement and played a strong predictive role. PCK evaluation was also found to reflect the knowledge required for effective early childhood teaching by Padilla & Van Driel (2011). This finding was in line with the current findings of teachers' pedagogical knowledge has great contributions to children's literacy and numeracy skills.

Similarly, the most crucial part of classroom quality is preschool teachers and their relationships with children (Gunn et al., 2013). As a result, it's critical to know what elements contribute to successful early educators. PCK (pedagogical content knowledge) is a key concept that has been linked positively with child outcomes (Kanter & Konstantinopolous, 2010; McCray & Chen, 2012; Munck, 2007). Leaders in early childhood education research have highlighted science as an "ideal domain for early childhood education" throughout the last decade (Bowman, Donovan, & Burns, 2001). However, limitations on the PCK for early play were currently observed. Understanding the PCK for early play is critical for informing professional development and effectively preparing our teachers to engage children in learning experiences.

According to studies, teachers with better content knowledge or higher pedagogical content knowledge can have a positive impact on children's achievement; and that high-level pedagogical content knowledge is more effective in education than high-level content knowledge because pedagogical content knowledge di-

rectly affects the quality of education they provide (Hill et al., 2005). Some studies have found that there has been a major expansion of preschool education; nevertheless, research reports have also found that preschool child education has been plagued by issues such as teacher qualification, and training quality, lack of instructional materials, insufficient classrooms, and other relevant facilities have also been identified as impediments.

In addition, in the study conducted by Zhang (2015), the pedagogical task of kindergarten teachers differs from that of primary and secondary school teachers since they do not only impart knowledge connected to learning topics during teaching. According to Park and Chen (2012), teachers must build specific knowledge beyond that required by the learning subject to suit varied students' interests, understandings, talents, and experiences. They must also get the ability to determine acceptable tactics and learning environments for the students. Pedagogical Content Knowledge, according to Shulman (1987), is a combination of these types of knowledge (PCK).

Preschool teaching is a difficult task, and deciding how to prepare and assist preschool teachers' professional development is hindered by a lack of clarity about what teachers should achieve (Blank, 2010). Although there is widespread consensus that preschool education is distinct and necessitates highly skilled kindergarten teachers who have a good impact on the teaching and learning process; with children, however (Blank, 2010). Kindergarten, preschool, nursery, and child-to-child education are all forms of preschool education that are predominantly delivered by various sectors (Aschalew, 2018).

In kindergarten today, play appears to have taken a back seat to teacher-directed instruction, based on the notion that the latter is more successful than the former in preparing children to do well on standards-based assessments (Kekesi et al., 2019). Graue (2009) explains this as follows: "expectations appear to have developed without a clear sense of purpose. The current findings consistency with the previous findings and the current emphasis on benchmarks and achievement has shifted attention away from what is learned and toward what is tested". This is a description of current kindergarten practices (Ashiabi, 2007). Some kindergartens place a heavy emphasis on drilling youngsters with the knowledge they need to know to achieve standards, leaving little time for play. Many teachers do not give time for play because of the expectations and standards that must be reached, or only allow time for play if all of the content for the day has been covered (Graue, 2009).

Children are more likely to participate in their learning when these are encouraged in the early grades. For instance, playing board games can improve math skills while fostering social skills. It is significantly more likely for struggling readers to continue reading and not quit when they participate in book clubs, dramatize stories, and other reading activities. Exploring a wide range of printed materials and writing equipment in a "writing area" can inspire hesitant writers and encourage kids to share their knowledge. Additionally, play encourages imagination and creativity, two important traits that help us cope, enjoy

ourselves, and invent. Students' creative abilities are strengthened through play and opportunities for active participation in learning. The opportunity for inquiry and problem-solving is expanded when preschool students are allowed to actively engage with the resources, issues, and topics.

According to the learning through play report, children learn that two squares can make a rectangle and two triangles can make a square by playing with geometric building blocks. They start to comprehend the characteristics of patterns, which serve as the basis for mathematics, by dancing a pattern like a step forward, step back, twirling, clapping, and repeating. A kid can communicate their ideas, thoughts, and feelings, learn to control their emotions, engage with others, resolve problems, and develop a sense of competence through pretend or "symbolic" play (such as playing house or market).

Free play with minimal teacher intervention has been emphasized in studies on developmental learning, while research on academic learning has favored the use of teacher-directed play and jointly guided play when the instructor takes an active role. Study on teachers' perceptions of play's function in learning reflects these divergent viewpoints in the research on play. By seeing the two perspectives as complementary to one another, researchers and educators need to move away from a split position and toward the integration of perspectives and activities (Pyle et al., 2017).

The current findings support the of the study conducted by [Manz & Bracaliello \(2016\)](#) that parents have a crucial role in encouraging the development and caliber of their toddlers' play. Parents may help their children develop social skills, cognitive skills, and language skills by playing with them and interacting with them ([Manz & Bracaliello, 2016](#)).

Similarly, children do better when their parents think the play is important for early learning, according to research. [Fogle and Mendez \(2006\)](#) found an association between parents' and teachers' perceptions of children's effective social skills and their infrequent display of disruptive or isolated play and their views of play as being important for development. Children who had parents who did not share similar play values, on the other hand, participated in interactive peer play less frequently. According to Gleason's research from 2005, children whose parents valued their children's imaginative play as a valuable educational opportunity exhibited enhanced language development ([Manz & Bracaliello, 2016](#)).

The home visitors' assessment of an "ah...ha" moment as a turning point when parents' recognition of the value of playing with their child led to their increased responsiveness to home visiting services is supported by the positive link between play beliefs and parental involvement. The study used a standard evaluation technique, parents' self-report, to evaluate the relationship between parental beliefs about the educational relevance of play and their actual involvement in toddlers' learning activities ([Manz & Bracaliello, 2016](#)).

The relationship between parents' beliefs, their academic expectations for their children, reports of formal and informal numeracy, literacy home practices, and children's test scores were predicted using hierarchical regression models.

Informal exposure to games with numerical content (measured indirectly through parents' knowledge of children's games) predicted children's knowledge of the symbolic number system, whereas reports of numeracy attitudes (such as parents' enjoyment of numeracy) predicted children's knowledge of non-symbolic arithmetic. The results of the home literacy study confirmed previous findings; parents' reports of formal literacy practices (such as teaching their kids to read) predicted children's word reading, whereas parents' reports of informal experiences (such as the frequency of shared reading, which was indirectly measured by parents' knowledge of stories), predicted children's vocabulary (Skwarchuk et al., 2014).

In conclusion, early childhood education, which includes preschool and kindergarten (Seefeldt & Wasik, 2006), is a critical first step in determining a child's future development (Morrison, 2007). As a result, when they are between the ages of 4 and 6, they go through the most significant learning phases that determine their future (Aljojo et al., 2019). Furthermore, children aged 0 to 8 years (especially between the ages of 4 - 6) develop distinct features in elementary and middle school (Dodge & Colker, 2001). They are active, interested, enjoy adventures, and absorb information at an incredible rate (Figueiredo et al., 2018).

5. Conclusion

This study provides parent play beliefs, play as a teaching technique, teachers' pedagogical knowledge, and children's early numeracy and literacy skills under six years of age, contributing to a more comprehensive understanding of the effects of these variables on children's early literacy and numeracy skills. It was conducted in some selected kindergarten schools, and teachers, parents, and children participated in the study. It contributes to the existing body of knowledge by showing that parent play beliefs, play as a teaching technique, and teachers' pedagogical knowledge and children's have a significant positive relationship with children's early numeracy and literacy skills. The combined impacts of those variables explained 76.4% of the variance in children's early numeracy and literacy skills. These data suggest that all independent variables were significant and positive predictors of children's early numeracy and literacy skills. Hierarchical linear modeling results showed that the parent play beliefs, play as a teaching technique, and teachers' pedagogical knowledge of ΔR^2 value of 0.020 revealed a 0.2% change in the variance of model 1, 2 and 3 with $\Delta F(1, 213) = 17.679, p < 0.001$.

Future Study

To encourage the adoption of these empirically and theoretically supported play-based learning practices, future policy and research need to concentrate on assisting teachers in balancing various types of play in the classroom. All areas of academic and developmental learning can be supported in a play-based kindergarten through a process of integration and negotiation (Pyle et al., 2017).

Future research would paint a more complete picture of how parents see the Ethiopian educational system and its relationship to kids' academic and social results. Additionally, parents indicated that while exposing their preschoolers to play is fine, doing so is not appropriate once they enter kindergarten. To have a fuller understanding of the relationships between parents' views, cultural orientations, and children's social outcomes, future work will need to include parents whose kids are transitioning to kindergarten and elementary school as well as expand the study longitudinally.

Future research that includes more participants from various backgrounds, as well as larger and more diverse samples in terms of socioeconomic status, gender, disability, culture, and parental education, is necessary.

Correlational and regression analysis cannot be used to infer any causal relationships in this study. Experimental research should be the main emphasis of future studies.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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