

# Investigating the Developmentally Appropriate Practices of Teachers in the Early Childhood Classroom

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**Abstract**

The aim purpose of this study was to explore the developmentally appropriate practices of teachers in the early. In this study, 6 professional early childhood teachers in the Bongo District of the Upper East Region of Ghana were sampled. Using observation and interviews to gather data for the study. Thematic analysis was used to analyse the data. Findings from the study identified that even though some teachers know the teaching strategies they fail to implement them due to several factors like inadequate teaching and learning materials and overcrowding in the classroom. This study recommends that teaching strategies and assessment procedures such as small group instruction and interviews in the early childhood mathematics classroom and stakeholders in education should make the effort to help make the learning environment conducive.

**Keywords:** Early Childhood Instruction, Assessment, Teaching and Learning Materials, Teaching Patterns.

**1.0 Introduction**

The idea of early childhood education has taken on new meanings over time. The social policy acts on day care, educational policy acts on early childhood education, and improvements in educational standards, as well as changes in theoretical and philosophical approaches to children, education, learning, and understanding, have all affected, resulting in a more diverse set of consequences for the definition of early childhood. Scientific and educational research now considers early childhood care and education to be the first and most important stage of the basic education process. Recent world conferences testify to a growing appreciation of the crucial importance of the child's earliest years, and of the need to support families and communities in their role as the child's most influential educator. UNICEF (2012), explained early childhood as the period that “spans the prenatal period to the age of eight and it is most intensive period brain development throughout the lifespan of the individual. In Ghana, the group of children that make up the early childhood are infants and toddlers (from birth to 36 months), Pre-Schoolers (from age 3 to age 4), Kindergarten (age 5 and 6), and pupils in primary class one, two and three (ages 6,7 and 8). At these ages of an individual's life, education should be taken seriously because what happens during this period can potentially influence their educational life. It is therefore imperative for early childhood educators to choose an appropriate teaching practice and material which is suitable to the development of children.

**1.1 Developmentally appropriate practice in the early childhood mathematics classroom**

According to NEAYC (2018), Developmentally Appropriate Practices (DAP) focus on making sure that educators provide opportunities to learn that are right for the age of the students. After all, a three-year-old child is not expected to learn the same way a thirteen-year-old would. A good DAP educator focuses on knowledge about child development and learning, knowing what is appropriate for each student, and knowing what's culturally appropriate.

DAP is a teaching method based on studies on how young children grow and learn, as well as what is understood about successful early childhood education (Jipson, 1991). Its structure is intended to facilitate the optimal learning and growth of young children. DAP entails teachers meeting young children where they are, both individually and in groups, and assisting each child in achieving demanding and attainable learning objectives. He further stated, three things to consider when choosing DAP in the early childhood mathematics classroom; they are:

- 1. Understanding child development and learning:** Knowing how children grow and learn at various ages is a critical first step. This research-based expertise aids us in predicting which interactions can benefit children's learning and growth.
- 2. Knowing what is personally appropriate:** It is the teacher's responsibility to understand what he or she knows about particular children to refine decisions about how to educate and care for each child as a person. We learn about and child's interests, talents, and developmental success by watching them play and communicate with the physical world and others.
- 3. Knowing what is culturally important:** We must make an effort to learn about the children's families and the beliefs, desires, and other influences that affect their lives at home and in their communities. This context knowledge enables us to provide each child and family with meaningful, appropriate, and respectful learning experiences.

Knowing this and the importance of choosing a developmentally appropriate practice for the early childhood teacher, it is imperative for the teacher to select a DAP that will help learners build their knowledge in the early childhood mathematics classroom. This will only occur when the learner is consciously engaged in constructing knowledge (Papert,2000).

## **1.2 Instructional Strategies in the Early Childhood Classroom**

Instructional strategies are techniques teachers use to help students become independent, strategic learners (Powell, Robert, Caseau, & Dana, 2021). These strategies become learning strategies when students independently select the appropriate ones and use them effectively to accomplish tasks or meet goals. They further explained that instructional strategies can motivate students and help them focus attention, organize information for understanding and remembering and monitor and assess learning. Some of these teaching strategies in the early childhood mathematics classroom are the project approach, multi-sensory approach, play/games-based approach and building-block approach

### **1.2.1 Project approach**

According to Katz (2000), a project is an in-depth study or investigation of a topic ideally, one worthy of the children's time and energy. A project approach offers the teacher a way to develop in-depth thinking while engaging the hearts and minds of young children. The teacher takes a strong guidance role in the process. In this approach, the teacher identifies or selects the topic to be studied, he does so by taking into account the interest of the pupils. And he puts pupils in groups for them to gather data and brief the class on their findings. This approach is grounded on the constructivist learning theory.

### **1.2.2 Multiple Representation**

Teachers' pedagogical experience includes representations, according to Shulman (1986). He also described these representations as "analogies, diagrams, examples, descriptions, and demonstrations, in other words, the ways of representing and formulating the subject that make it understandable to others" (p.9). Ball et al. (2008), for example, stressed representations as part of the advanced material awareness of mathematics that is unique to teaching. Selecting representations for specific purposes, understanding what goes into using a particular representation, and connecting representations to underlying ideas is all part of this advanced information. Teachers need to be able to come up with a variety of representations as there is "no single most powerful forms of representation" (Shulman, 1986, p.9).

### **1.2.3 Scaffolding**

Scaffolding in education refers to the use of a range of instructional strategies aimed at pushing learners toward better comprehension and eventually greater freedom in the learning process, according to NaCCA (2019). It entails breaking down the learning episode, experience, or idea into smaller chunks and providing learners with the assistance they need to master each one. A teacher may need to work with a learner who is having trouble writing to help them develop fine motor skills by doing things like writing in the sand, scribbling on paper, and screwing and unscrewing bottle lids. This will enable the learner to develop control over the muscles and be more ready to hold the writing material to write. The curriculum further stated some common scaffolding strategies available to you the early childhood teacher which includes:

1. start with a simple version of a task or instruction and progressively increase the complexity or difficulty over time
2. Using a variety of methods to describe or illustrate a concept, problem, or procedure to ensure that it is understood.
3. providing learners with a model or example of a task that they will be expected to complete
4. improving phonological comprehension so that students can read simple words and sentences
5. Clearly stating the aim of a learning activity, as well as the instructions that learners must follow and the learning objectives that they must meet.

### **1.3 Early Childhood Assessment**

National Council for Curriculum and Assessment (NaCCA) (2019), explained assessment as the process of collecting and evaluating information about learners and using the information to make decisions to improve their learning. In the Ghanaian early childhood curriculum, it is suggested that assessment is used to promote learning. Its purpose is to identify the strengths and weaknesses of learners to enable teachers to ascertain their learners' responses to instruction. Assessment is both formative and summative. Formative assessment is viewed in terms of Assessment as Learning and Assessment for learning while summative assessment is viewed as Assessment of Learning (NaCCA, 2019).

Childhood assessment is a process of gathering information about a child, reviewing the information, and then using the information to plan educational activities that are at a level the child can understand and can learn from. According to the early childhood curriculum, authentic assessment methods at the early childhood level of education are observation, checklist, running records, portfolios.

#### **1.3.1 Methods of assessment**

Methods of child assessment can be informal (conducting natural observations, collecting data and children's work for portfolios, using educator and teacher ratings) and formal (using assessment tools such as questionnaires and standardized testing). Both methods are effective and can help inform educators and parents about a child's progress (Black & William, 2009). They outlined the following types of assessment tools at the early childhood level: Observations, Portfolios, Running Records, Parent Ratings, Standardized Tests.

### **1.4 Teaching and Learning Materials (Teaching Aids)**

Chamunorwa (2010) defined instructional materials as objects or devices which help a teacher make a lesson much easier to comprehend. Teaching aids are used by teachers to help learners improve

reading and other skills, illustrate or reinforce a skill, fact, or idea and relieve anxiety, fears, or boredom. Dewey argued that the provision of the first-hand experience in a child's learning program matters a lot and this is best exercised when children are provided with relevant instructional materials to manipulate. Dienes suggested that learners need to construct their ideas from within the environment and use instructional materials from their immediate environment to help them master the concepts well rather than learners having those ideas imposed on them. All these promote the use of manipulatives in the teaching and learning of mathematics. Asoga, and Allen, (2003), stated some of the types of instructional materials as audio-visual materials, visual materials and printed resources. Zimmerman (2000), defined audio-visual materials are instructional or educational televisions and laptops. Balo as cited in Zimmerman (2000) indicated that audio-visual materials bring about mastery of the content and they give children first-hand information hence help children learn the concept and provide an experience that is not easily secured when using other instructional materials. Mcnaught, (2007) considered audio-visual materials as essential means of increasing the effectiveness in teaching and learning, he is of the view that the materials make learning more interesting thereby contributing to the depth and way of learning. He strongly suggested that visual aids help greatly in number value by improving in ordering, classification and counting according to him when learners use these visual aids, they master concepts that they have learnt, this enhances their achievement in mathematics. Also, there is a wide range of printed materials for teaching and learning number work they include charts, number cards, number strips mathematical puzzle cards and textbooks that can be used to teach number recognition, ordering sequencing among others.

#### 1.4.1 Special teaching aids used for the early childhood mathematics classroom

Different teaching aids are used for teaching different concepts in the early mathematics classroom. Zimmerman (2000) listed the following are some of the teaching and learning materials that are used in the early childhood mathematics classroom are:

1. **Dienes Blocks/ Dienes apparatus:** Dienes' notion of embodied knowledge presaged other cognitive scientists who eventually came to recognize the importance of embodied knowledge and situated cognition- where knowledge and abilities are organized around experiences as much as they are organized around abstractions. The Dienes block has four types. These are (i) Units (ones) (ii) Rods (tens) (iii) Flats (hundreds) (iv) Blocks (thousands) We can make Dienes' blocks using wood.
2. **Attribute blocks:** Zimmerman (2000), explained attribute blocks as mathematics manipulatives that have four different features. These are shape, colour, size and thickness. The shapes are circles, hexagons, squares, rectangles and triangles. The three colours are red, blue, and yellow. The two sizes are big and small. The blocks are either thick or thin. We can use the attribute blocks for the concept's sorts, shapes, patterns and order.
3. **Abacus:** An abacus, also called a counting frame, is a calculating tool used primarily in parts of Asia for performing the arithmetic process. Today, abacuses are often constructed as a bamboo frame with beads sliding on wires, but originally, they were beans or stones moved in grooves in sand or on tablets of wood, stone or metal. The abacus was in use centuries before the adoption of the written modern numeral system and still widely used by merchants, traders and clerks. Teachers can make abacus using wood, stick and beads. Abacuses are used to introduce place values in the early childhood classroom.

### **1.5 Interaction Pattern in the early childhood classroom**

Early childhood centres are the start of formal education, and they are where children begin to communicate and socialize. The majority of the activities that take place in these centres are performed in groups. Pre-schoolers learn to share, tolerate, and collaborate during the day. As a result of their participation in group activities, they will acquire values such as tolerance, respect, teamwork, leadership, and so on. These principles are necessary ingredients for developing social skills, which will be critical as adults in the future.

For the students, social experiences, especially peer interactions, play several important roles. Building friendships for example promotes positive social and emotional development. The willingness of children to engage, understand and appreciate events influences the development of social skills. A child with higher capability is better prepared to understand social cues and acquire more complex skills like problem-solving and conflict resolution. One of the most important characteristics of social skills that will help children understand the world and develop their self-confidence is social contact among preschool children. It will also have an effect on their personality in the future.

#### **1.5.1 Children Interaction and learning**

Many approaches and interventions have been developed through research and pilot projects to encourage children to interact in an educational setting, particularly during school. The sociocultural perspective, activity theory perspective, language and thinking, dialogue and meaning, motive and activity, mediation and tool, communication and contest and interaction, and the zone of proximal development were all used to support the use of puppets as a tool in preschool (Vygotsky cited in Essuman 2020). Interestingly, during this study, children were encouraged to engage with the puppet in their everyday lives at preschool, so that it became ingrained in their culture, with the aim of eliciting children's innate desire to speak with, about, and because of the puppet. In general, this study was effective in encouraging the use of puppets in preschool classrooms because they seemed to help children develop their affective domain, stimulate their knowledge formation and expand their symbolic, analogous, and persuasive language, and encourage collaboration between children and teachers. At college, the teacher plays an important role in the engagement of the students. Adults are the primary conversationalists, questioners, listeners, respondents, and sustainers of language learning and growth in the care centre or classroom, according to Genishi (1988). Teachers have a plethora of opportunities to engage with students at school, both during and outside of class.

Massey (2004) conducted descriptive studies in the classroom to learn more about the interactions between preschool children and their teachers. Teachers can use this function during book reading time, playtime, and recess, according to some recommendations. Presenting a piece of literature with props and lowered voices, exchanging opinions on drawings in reading books, probing the talk about things during pretend play, and adding new relevant words during mealtime. Preschool teachers, according to Massey, should engage children in cognitively demanding conversations to help them develop language skills.

### **1.6 Research Questions**

1. What instructional strategies/methods teachers often use in the early childhood mathematics classroom?
2. What are teachers' assessment practices in the early childhood mathematics classroom?

3. What teaching and learning materials are often used in the early childhood mathematics classroom?
4. What is the interaction pattern in the mathematics classroom?

## **2.0 Methods**

The present study sought to gain contextual knowledge about the developmentally appropriate practice in the early childhood mathematics classroom. The study adopted a case study design of the qualitative research method.

This research design was chosen based on the research problem of the study to explore the teachers' interactions during learning activities. By using this type of research design, the researcher was able to understand the phenomenon, learn the variables as well as learn from the participants through exploration (Creswell, 2013).

### **2.1 Instruments and Methods of Data Collection**

A case study is "an empirical investigation that examines a modern phenomenon within its real-life context," according to Creswell (2013, p.13). The researcher was able to present a detailed account of the phenomenon of children's contact during learning activities thanks to this descriptive case study. Direct observation of children's social contact during learning experiences and interviews with teachers provided the evidence for this analysis. Observation, according to Baker (2009), is the systematic documenting and accumulation of measurable events or behavior in a natural setting. According to Creswell (2013), a researcher can access open-ended and direct information by carefully observing people and places at a study site. The direct observation (which was conducted in many sessions) is appropriate because the researcher was able to observe their behavior in a real-world setting; classroom or outside the classroom, because this study involved children in their years during their learning activities. During observation sessions, fieldnotes were taken. Fieldnotes are the writings or text accounts reported by the researcher during an observation, according to Creswell (2013). The descriptive field notes of the events, actions, and behaviors of the teachers (i.e. what happened, how it happened) were collected in this report, as well as reflective field notes, my narrative and personal opinions, ideas, and themes that emerged during the observations. The interview data was analyzed using thematic analysis.

### **2.2 Participants and context of the Study**

The participants were chosen based on the intent of the study, which is to investigate the experiences that occur during preschool children's learning activities. Purposive sampling was used in this study, which meant that the participants were selected by the researcher based on certain characteristics. The study used random purposive sampling instead of purposive sampling because the purposive sample was too large for the study (though it is still a small sample size). This random purposive sampling improves the sample's reliability and places the least decision within a specific group (Creswell 2013).

### **2.3 Setting/Context and Time Frame**

This study took place in two early childhood classrooms. The researcher observed the classes during their learning activities in which most of the time, took place in the classroom based on the timetable of the kindergarten.

## 2.4 Data Collection Analysis

In conducting this study, several steps and procedures are to be adhered to. Before the observations were carried out, the process of identification of participants (teachers) and the setting was done to make sure they can best help me to in the study. In this case, the participants have been acknowledged as the early childhood educators in the school.

## 3.0 Findings and discussion of results

### 3.1 Instructional strategies/methods

During the observation in both classes, they saw that the teachers employed the learner-centred method of teaching. Pupils were involved in the teaching and learning process through the singing of rhymes and play activities. The walls of the classroom room were decorated with beautiful pictures which are learner-friendly also the researchers observed that the teacher was finding it difficult to manage the class since the pupils were many, the room was small and their arrangements did not allow free movement by the teacher.

After the observation, teachers of both classes were interviewed. So, they were “What are some of the instructional strategies do they use during the teaching and learning process used in your classrooms?”

Teacher 1: *I mostly use play, modelling, mind mapping and games.*

Teacher 2: *I normally use play, games and trip but due to the overcrowding nature of the class I sometimes take them outside.*

The responses from the teacher tell that they know the right strategies to make teaching and learning fun and effective but the observations made showed that even though the teachers know the right thing to do, they find it difficult to do it due to the large class size

They also asked “Do you go for workshops on the teaching strategies used?”

Teacher 1: *yes, the education directorate organises it*

Teacher 2: *yes, we do it at least once every term*

From such responses, it was obvious that they have been attending the workshop which has over the years been organised in their district by the district director of education.

### 3.2 Teachers' assessment practices

During my observation, it was noticed that the assessments used by the teachers were in line with the instructional objectives of the lesson. During the lesson, pupils were verbally commended or praised for answering a question correctly. Those who gave wrong answers were encouraged and guided to the right answer. This motivated them to contribute to the lesson. The researchers interviewed the teachers after the lesson. During the interview, they were asked the following questions.

“What assessment practices do you use?”

Teacher: *I observe them and write their performance, and also record their performance in the class works*

Teacher: *I use observation, portfolios and parent ratings*

So, the researchers further asked the KG 2 teacher “How do you go by the parent ratings?”

Teacher: *I give pupils assignments for their parents to guide them to do it. The parents later bring feedback.*

The researchers further asked both of them “Do you face any challenges during the assessment and why?”

Teacher: *yes. Because of the pupils' number*



Teacher: *yes, we face a lot of problems. This is because the pupils are many.*

### 3.3 Teaching and learning materials

During the observation, stated above, the classes used “*a talking wall*” thus, the walls of the classrooms were decorated with the works of the pupils and other pictures which helps in the teaching and learning process. Counters (bottle tops) were also used during the lesson. Pupils were made to perform additions using the counters. After the observation, the teachers were interviewed were asked the following “How do you get the beautiful pictures on the walls of the classrooms”

Teacher 1: *the headmistress buys them for us using the capitation grant*

Teacher 2: *most of the items were brought by pupils and they are the works done by the pupils. And the headmistress also buys some for us.*

The statement made by the teachers goes in line with the assertion of (Apte, 2014) as he stated that, the teaching strategy/ method employed by Mathematics teachers depends on the teaching and learning aids provided by the school to teach to the better understanding of the learners.

### 3.4 Interaction pattern in the classroom

The first apparent pattern identified was constructive dialogic interaction. Referring to this study, constructive-dialogic interaction represents the conversation between teachers and children in sharing their different core values, worldviews and identities. Through these interactions, the teachers specifically were able to explore the pre-existing knowledge of children and help to construct children's understandings of the particular subject matter.

From the observation, the constructive-dialogic interaction had been recorded through the communications between children and their teachers (the teacher and the assistant teacher) where the children responded to the enquiries, replied to the probing questions and accepted the giving feedbacks and directions. The observation indicated that the teacher introduced subject matters by posing questions and encouraging children to share their experiences. The researchers also observed that the classroom was crowded and the arrangement in the class impeded the free flow of pupils.

After the observation, the teachers were interviewed, thus the KG 1&2 teachers. So, they were asked, “Are children involved in the teaching and learning process?”

Teacher: *yes, pupils are always involved in the lesson*

Teacher: *yes, pupils are actively involved*

The researcher asked them “How do pupils engage freely in various activities since the classrooms are overcrowded”

Teacher: *hmmm, it is been a problem, but I make sure I only use an activity that doesn't involve pupils moving from their seats.*

Teacher: *I do my best to make the various activities*

### 4.0 Conclusions

The following conclusions were drawn from the study:

1. Some teachers know the teaching strategies but fail to implement them in the classroom
2. The teaching and learning materials are not enough due to the population of the class.
3. The hands-on approach of teaching is not practised by some teachers

#### 4.1 Recommendations

Early childhood educators are doing incredible jobs. Their job is very demanding. From the study, the respondents (teachers) did their best with the limited resources. But the following recommendations were made:

1. Learners in the training colleges should put into practice they learn in the colleges and university to help pupils achieve the best learning in the early childhood mathematics classroom.
2. Teachers should be encouraged to have a good interpersonal relationship with the pupils and since responsive interpersonal relationships with teachers nurture young children's dispositions to learn and their emerging abilities. Education and care in the early years are two sides of the same coin, in effect teachers should relinquish a great amount of care to these young learners to improve both social competence and the ability to exploit learning opportunities
3. Large class size makes it difficult for teachers to use some recommended teaching strategies and assessment procedures such as small group instruction and interviews in the early childhood mathematics classroom. Again, it was found out that teachers always relied on the materials made by pupils as well as the inception of the capitation grant to purchase factory-made ones.

#### REFERENCES

- [1] Apte, A. (2014). Mathematics teaching aids. Retrieved from [www.authorstream.com/Presentation/Amruta\\_Apte-2083268-mathmatics-teaching-aids/](http://www.authorstream.com/Presentation/Amruta_Apte-2083268-mathmatics-teaching-aids/) on 20th March 2020.
- [2] Asoga, A and Allen, K. (2003): Instructional Materials Improvising Students Teaching Practice Exercise in Nigeria Teacher's Colleges' Academic Review.
- [3] Baker, L.M. (2006). Observation: A Complex Research Method. *Library Trends*. 55 (1).171-189.
- [4] Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59(5), 389-407.
- [5] Black, D. Wiliam (2009). Developing the theory of formative assessment *Educational Assessment Evaluation and Accountability*, 21 (1) (2009), pp. 5-31
- [6] Chamunorwa, J. (2010). The Importance of Learning and Teaching Aids in the Education Process: Retrieved March 27, 2021, From [Http://Zvavanhu.Mywapblog.Com/](http://Zvavanhu.Mywapblog.Com/) The-Importance-of-Learning-and-Teaching.Xhtml
- [7] Creswell (2013). *Mixed-Method Research*: Sage Publications. London

- [8] Essuman S. A (2020). *Teachers perception and practice of assessment in the mathematics classroom of kwaebibirim municipality*. Unpublished Master's Thesis Presented to Department of Basic Education, University of Education Winneba, Winneba, Ghana.
- [9] Genishi, C. (1988). *Young children's oral language development*. [Online] Retrieved March 19, 2021: <http://npin.org/library/pre1998/n00406/n00406.html>
- [10] Jipson, J. (1991). Developmentally appropriate practice: Culture, curriculum, connections. *Early Education and Development*, 2(2), 120–136.
- [11] Katz, L.G. (2000). The Project Approach in the early years. *Childcare Information Exchange*, 9(01),48-51
- [12] Massey, S. L. (2004). Teacher – child conversation in the preschool classroom. *Early Childhood Educational Journal*, 31(4), 27 – 31.
- [13] Mcnaught, A. (2007). Moving images and sound: inclusive and accessible. In moving images knowledge and access. BUFVC handbook edited by Grant, C and Mekere, I. London: British Universities film and video council. PP29-33.
- [14] NAEYC, (2018). *Spotlight on Young Children and Assessment*. Derry Koralek, ed. Upper Saddle River, N. J: Merrill Prentice Hall.
- [15] National council of curriculum and assessment (2019). (Ministry of Education) Mathematics Curriculum for B7- B10.
- [16] Papert, S. (2000). What's the big idea? Toward a pedagogy of idea power. *IBM Systems Journal*, 39(3 & 4), 720–729. <http://dx.doi.org/10.1147/sj.393.0720>.
- [17] Powell, Robert, Caseau, & Dana. (2021). Instructional Strategies. *Classroom Communication and Diversity*.
- [18] Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-1
- [19] Zimmerman, B. J. (2000). Attaining self-regulation: A social-cognitive perspective. In M. Boekaerts, P. R. Pintrich, and M. H. Zeidner (Eds.), *Handbook of Self-Regulation*. San Diego, CA: Academic Press.