

The Role of Early Childhood Mathematics Teachers during Play in the Mathematics Classroom in Bongo District of Ghana

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Abstract: The study sought to find out the role of early grade mathematics teachers during play in the mathematics classroom. The study adopted the quantitative approach of research with a descriptive survey as a design. A simple random sampling and census sampling were used to select 410 respondents for the study. The data were analyzed using mean and standard deviation. The findings of the study revealed that teachers played such roles as and facilitators to guide and provide the materials necessary for the play, thereby creating a conducive environment for effective play in the early childhood mathematics classroom. It was recommended that play-based learning should be fully integrated into the early childhood Mathematics curriculum, and intensive workshops or in-service training should be organized for the teachers to know and appreciate their roles during play in the classroom. Also, workshops or seminars organized for teachers should concentrate on how to assist teachers to prepare play materials using local materials to bridge the deficit gap of play materials.

Keywords: Developmentally Appropriate Practices; free play; intellectual development

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Introduction

Early childhood education is critical because it lays the groundwork for learners to establish schema (Piaget, 1972) and build on them as they progress through their studies. As a result, the early stages are crucial. The National Association for the Education of Young Children (NAEYC) emphasizes the necessity for teachers to use developmentally appropriate approaches when teaching young children because of the importance of this stage

in education. According to the National Education Association for Young Children (NAEYC), Developmentally Appropriate Practices (DAP) focuses on ensuring that educators give learning opportunities that are appropriate for the kids' age. A big part of DAP is learning via play. The relevance of play within the context of childhood is the key statement weaved throughout this study. Vygotsky, Piaget, Montessori, Dewey and Froebel are just a few of the well-known pioneers who set the groundwork for early childhood

education. The findings of these illustrious scholars continue to have an impact on people today. Even though their methodologies differ, they all believed that children learn best through active engagement and that meaningful learning happens most often during play (Pramling, Samuelsson & Johansson, 2006).

Ginsburg (2007) defined play as the relationships and involvement that a kid experiences during everyday activities. Since Fred Froebel invented the notion of kindergarten in 1816, which means “child’s garden,” it has been an important aspect of early childhood education (UNICEF, 2013). Recent kindergarten or early childhood instructors are concerned about how to incorporate play into their classes. Playtime is frequently used by teachers as a reward for excellent behaviour.

By allowing children to practice their culture, self-regulation and place in society through play, they can begin to grasp their culture, self-regulation, and place in society. Play allows a child to perceive the world through the eyes of his or her peers. They begin to comprehend the viewpoints and distinctions of others. Children become aware of their place in society as a result of modelling and interaction. Finally, play assists, kids in becoming participating members of society and contributing members of the societal structure (Wood & Attfield, 2005). It is critical to safeguard children's play, which serves as a means for them to experience new cultural situations and make their own choices and conclusions (Sandberg, 2002). Children can express both positive and negative emotions through play. Children can use play objects and give them real-world meaning during pretend play. Children who have the opportunity to play are more imaginative and expressive in their daily play (Ailwood, 2003).

Play is a broad term that may be examined from a variety of theoretical perspectives, allowing for a wide range of observations and interpretations. Many scientists have investigated the role of play in early childhood education and discovered that it is critical for learning and development. Early educators such as Jean-Jacques Rousseau, John Dewey, Maria Montessori, Friedrich Froebel and Rudolf Steiner contributed significantly to this (Wood & Attfield, 2005). Each of the forerunners had a unique perspective on the play. Play, according to Ailwood (2003, p. 288), is “an elusive idea that refuses to be pinned down.”

Professional practice decisions and subsequent play opportunities for children are likely to be influenced by the “play” discourse that most closely matches individual values and views. In any case, play is recognized as a social activity in a specific socio-cultural context, initiated by either children or/and adults.

The child-centred play has the potential to be a viable, successful and low-cost method of encouraging proper development in preschool children. Teachers should pay attention to their learner's academic performance through the use of different child-centred approaches. According to Mweru (2012) who agrees with the findings of Goffin and Wilson (2003), encouraging learners to work, discuss and solve problems in groups boosts their interest in learning and easy retention of concepts and a successful introduction of learners to Mathematics, Language, Science, Social Studies, play activities and games. are supposed to teach basic skills through games, music, artwork, videos, books, charts and other methods, Mweru’s research further indicated the teachers’ influence on learners’ selection and use of play materials in the whole country.

According to Essuman, Korda and Essigyan (2021), a good DAP educator focuses on knowledge about child development and learning and knowing what is appropriate for each student, and knowing what's culturally appropriate. Therefore, the role teachers play as part of the developmentally appropriate practice is very crucial.

Students' performance in mathematics over the years has been on the decline, and authors like Nabie (2013) emphasize the importance of using games to improve the teaching and learning of mathematics as one of the key approaches that bring about effective teaching and learning in the mathematics classroom. Aside from Nabie, other researchers (Mcfeetors & Palfy, 2017) conducted studies on the importance of play in the mathematics classroom. But the teacher is yet to find his role during play in the mathematics classroom. This study focused on finding out the roles which early childhood educators play during play in the mathematics classroom.

Literature Review

A study conducted by Essuman, Nyarko and Frimpong (2021) established that an effective teaching practice, direct instruction or more a

formal way of teaching provide limited and short-term advantages in children's learning, increase stress and anxiety, and demotivate learners. A more detailed examination of teachers' beliefs about the role of play in children's learning, as well as an analysis of their interactions with learners during play activities, using structured observations or video recording, has resulted from a shift in thinking about the role of teachers in children's play.

The psychological underpinnings of the teacher's belief system impact his or her involvement in play both directly and indirectly. Psychological theory shapes ideas about the nature of childhood development, and learning whether consciously or unconsciously. Four major lines of thought continue to impact early grade development, particularly as it relates to playing within the psychological theory (Needham & Jackson, 2012). The Piagetian hypothesis, on the other hand, emphasized the importance of play in a learner's intellectual development. "Knowledge arises from an internal psychological core through an interaction or dialogue with the physical and social environment rather than direct biological maturation or direct learning of external givens from the environment," (Fisher, Hirsh-Pasek, Golinkoff, Singer & Berk, 2011 p. 7). Knowledge, according to the cognitive-developmental stream, is actively produced by the learner when new information is evaluated and absorbed in light of existing knowledge as described in Piaget's constructivist theory. In reaction to new experiences, the learner adjusts mental structures through the process of assimilation and accommodation. The Piagetian views the learner as an active inquirer with established cognitive patterns rather than as a blank slate, an empty vessel or tabula rasa as John Locke puts it. The instructor is more actively involved in the children's play as a facilitator and guide in this approach (Fisher, et al, 2011).

Play is a universal activity that both humans and animals engage in, and it is frequently regarded as a necessary part of existence. Physical play, play with objects, symbolic play, pretence/socio-dramatic play and games with rules are some of the types of play (Power, 2000). When it comes to free play, most youngsters do not require the assistance of a teacher or an adult. They can play freely without adult supervision if they have the necessary props, space, and time. However, there

are occasions when children require the teacher's assistance in facilitating their play.

Role of Teachers in Supporting and Guiding Play Practices

The presence of a teacher is one of the indicators children use to distinguish between play and non-play circumstances. When a teacher is present, children regard an activity as work rather than play, and they approach a task with less playfulness which improves teaching and learning. When children labour independently, they exhibit higher signs of metacognitive monitoring and control (Pyle & Danniel, 2017). This is surprising, given how important teachers' roles are in facilitating development. A 'pedagogy of play' has been formed around this notion, which is framed as how teachers make play accommodations, plan an atmosphere for play, and support and promote learning through play in the classroom (Wood & Attfield, 2005). Bernstein (1996) offered constructs for supporting or promoting learning, sometimes known as teaching or pedagogy (the activity of teaching).

As previously indicated, teachers' presence provides learners with independence, involvement in activities and a sense of control, depending on their behaviour. Whether or not a teacher is present has an impact on the children's choices giving them more power over their activities. According to Frimpong, Essuman and Nyarko (2021), direct instruction or more formal ways of teaching result in limited and short-term increases in children's learning, increase stress and anxiety and demotivate children. The shift in thinking about the role of teachers in children's play has resulted in a more detailed examination of teachers' beliefs about the role of play in children's learning, as well as an analysis of their interactions with children during play activities, using structured observations or video recording.

Because the role of teachers in children's play is a difficult and under-researched topic, some European experts voiced some slightly diverse perspectives. On the one hand, Broström (2003) believes that only active teachers or parents can unlock the full potential of play. Without interfering, teachers should provide materials, safe areas and toys to enable children to play. However, these proposals varied in substance more than in response to the situation in their own country. As an example, Denmark has a lot of

free play in schools and teachers do not get involved or participate in children's play. Broström further advocated for increased teacher involvement and structure which he believes would be good for children. Teachers are in charge of structuring and directing the activities of the children.

Some data suggest that when a teacher organizes the play, children are more interested in attracting the attention of the teacher and are less inclined to participate in shared activities with their peers. Teachers' opinions regarding their role in play were investigated through interviews and discussions, and children's play activities in the classroom were videoed (Broström, 2003). The films were then used to persuade teachers to consider if their intentions and plans were carried out in their classrooms. The teachers were all on the same page when it came to the goal of play and how it relates to learning. According to the teachers, intrinsic drive and child initiation were the fundamental characteristics of play. Through planning and organization, the environment, and their learning aims, the instructors' theories of play were turned into practice.

Overall planning was driven by broad developmental goals rather than what the kids would learn from individual play activities. Their more precise goals centred on language acquisition and sociability. When the teachers watched the movies, they noticed many instances where their theories about play and their practices were at odds. For example, reception-age children frequently lacked the social, physical, and cognitive abilities needed to engage in successful play, carry out their goals, negotiate, play together, or settle disagreements. When a teacher was unavailable or refused to interfere, the play would occasionally break down, leaving the youngsters frustrated and demotivated. Furthermore, the instructors' theoretical conceptions of their roles were not always congruent with how they controlled the classroom. Even for the play activities that should remain in the child's environment, the play activities were frequently more teacher-led than child-initiated.

According to Cooper (2014; Pyle and Daniels (2017; Weisberg, Pasek and Glinkoff (2013); Pramling et al, (2006); Gooch (2008), free play is an experience that is led and decided by the child

without any adult intervention. Teachers, on the other hand, supply learning materials and information while maintaining a high level of adult control over tasks (Fosnot & Perry, 2005; Epstein, 2014; Walsh et al., 2007). Teachers can examine the desired objectives of the learning activity and employ purposeful teaching strategies to assist new learning that emerges as a result of a play interaction when deciding where on the continuum to situate their participation (Epstein, 2014; Weisberg et al., 2013; Alfieri, Brooks, Aldrich & Tenenbaum, 2010; Pyle & Bigelow, 2014).

Tarman and Tarman (2011) went on to highlight some of the most important functions that teachers play throughout the play. They stated that it is the teacher's responsibility to set the stage for the play, which they do by determining the play's timing and duration. As instructors, we must set up our schedules in such a way that children can design and carry out play ideas. Children require extra time to select people and negotiate roles, design objects and construct play props, especially during dramatic and constructive play. Zigler, Singer and Bishop-Josef (2004) also indicated that the teacher's job during play is to act as an onlooker or observer.

They believe that the teacher's observer function is clear and similar to that which is played in other areas of the early childhood classroom. Teachers must carefully monitor play to determine whether, when, how, and with whom to intervene. Other studies have highlighted the limitations of early childhood mathematical education. One of the fundamental constraints of play, according to Rogers and Sawyer (1998), is conflict and aggressiveness. This is frequently the result of a lack of physical space or play supplies. When space is limited, rough and tumbles play and running are reduced, whereas physical contact increases. These materials and space are required to encourage active and high-quality participation during play. Therefore, it is important to provide these materials and equipment that are appropriate to the children's developmental level and support a nonsexist and multicultural curriculum (Bredenkamp, & Copple, 1997).

Methodology

Research Design

The study adopted a mixed-method approach of research with the sequential explanatory as a

design. Creswell (2013) defines an explanatory sequential design as “first collecting quantitative data, then collecting qualitative data to assist explain or elaborate on the quantitative results.”

Population and Sampling

The population of the study was made up of all 642 Mathematics teachers in Bongo District. While Bongo District had 120 basic schools, a simple random sampling was used to select 80 schools. A census sampling technique was used to select all 410 Mathematics teachers in the sampled schools to participate in the study.

Data Collection Instruments

A structured questionnaire guide was used to gather data for this study. In terms of Permission, the researchers sought permission from the district director of education who issued an introductory letter introducing the researchers to the headmasters of the schools sampled for the study. The headmasters also gave their permission for the study to be conducted in their schools. Before the questionnaires were distributed to the teachers, respondents were assured of confidentiality and anonymity.

Validity and Reliability

To ensure the validity of the instrument, the questionnaire was subject to scrutiny by colleagues and some senior members to make sure the instrument is valid. To ensure the reliability of the instrument, a pilot study was done in the next district (Kasena Nankana District). Data from the pilot study were coded and scored before entering them into the

computer. The Statistical Product for Service Solution (SPSS) Version 26 was used to calculate the Cronbach Alpha Coefficient. A Cronbach's alpha reliability coefficient of 0.812 was realized which indicates that the instrument was highly reliable for data collection.

Statistical Treatment of Data

Quantitative data was analyzed using descriptive statistics (mean scores and standard deviation). The questionnaire was put on a 4-point Likert scale. In terms of the 4-point Likert scale used, which makes the average score to be 2.5 $[(1+2+3+4) \div 4]$ the determination of the mean of teachers' involvement in play in the mathematics classroom. The statistical mean of <2.50 indicated low involvement or participation, between 2.50 and 3.50 indicated moderate involvement and greater than 3.50 indicated a high involvement or participation.

Findings and Discussion

The analysis started with demographics of respondents and then the analysis of the research question that guided the study.

Demographics of Respondents

According to table 1, male respondents constituted 40.9% while their female counterparts constituted 59.1%. Therefore, the majority of respondents were females. On the other hand, those teachers with diploma constituted 55.8%, those with bachelor degree constituted 43.2% while those with master's degree constituted only 1%. Therefore, majority of respondents were diploma holders.

Table 1: Demographics of respondents

Demographic Data	Category	Frequency	Percentages (%)
Gender	Male	168	40.9
	Female	242	59.1
	Total	410	100.0
Level of Education	Diploma	229	55.8
	Degree	177	43.2
	Masters Degree	4	1.0
	Total	410	100.0

Research Question 1: What are the roles of teachers during play in the early childhood mathematics classroom?

To answer the research, table 2 was constructed. The research question sought to find out the roles that early childhood mathematics teachers play during play in the early grade mathematics classroom.

Table 2 indicates that teachers highly participated in assisting learners to handle and manipulate play materials. The table further indicates that teachers moderately participated in guiding and instructing learners on how to play, in keeping and availing playing materials, cleaning the playgrounds and in providing play facilities, equipment and material. Therefore, teachers

generally participated during play activities in the schools under investigation. The findings from the study go in line with that of Tarman and Tarman (2011) who stated in their study that the role of the teacher during play in the mathematics classroom is to “set up the stage”, this is done by

the teacher guiding and instructing learners on to go about the play to make it educative as intended and serve as onlookers or observers (Ziggler et al, 2004 during play in the early childhood mathematics classroom.

Table 2: Roles of Teachers during Play in the classroom

	Statement	Mean	Std. Dev.	Participation level
1	Guide and Instruct learners on how to play	3.4	0.51	Moderate
2	Keep and avail play materials	3.5	0.52	Moderate
3	Assist learners to handle and manipulate play Materials	3.6	0.48	High
4	Tide up and clean play grounds	3.3	0.86	Moderate
5	Provide play facilities, equipment and Materials	3.4	0.51	Moderate

The findings further conform with the findings of Broström (2003) who indicated in his study that, the role of the teacher is to create an enabling environment for the learners’ by providing them with the materials and toys needed for the play. Bredekamp and Copple (1997) also indicated how it is important to provide these materials and equipment that are appropriate to the children’s developmental level and support a nonsexist and multicultural curriculum.

Conclusions and Recommendations

Conclusions

The role of teachers in the early childhood Mathematics classroom when it comes to playing is very crucial since it helps in the effective utilization of play in the classroom. The study concludes that teachers’ level of participation is high when it came to assisting learners to handle and manipulate play materials. The study also established moderate participation among teachers in terms of keeping and availing play materials, guiding and instructing learners on how to play, tidying up the playgrounds and providing play materials for the learners.

Recommendations

Based on the above conclusions, the following recommendations were made:

1. Play-based learning should be fully integrated into the Ghanaian early childhood Mathematics curriculum, and intensive workshops or in-service training should be organized for the teacher to know and appreciate their roles during play in the early childhood Mathematics classroom.
2. Stakeholders like the Ministry of Education, the Ghana Education service and other NGOs should assist the schools with

adequate teaching and learning materials, like play toys to reduce the stress that teachers go through any time they try to implement play-based learning.

3. Workshops are seminars organized for teachers should concentrate on how to assist teachers to prepare play materials using local materials to bridge the deficit gap of play materials

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