



Analysis of Optical Energy Band Gap of Aluminium Zinc Sulphide (Al_2ZnS_4) Ternary Thin Films Grown by Solution Growth Technique.

Nwifior K¹. and Ifeanyichukwu B.J²
Department of Physics,
Ebonyi State College of Education Ikwo¹,
Ebonyi State, Nigeria

Department of Industrial Physics²,
Ebonyi State University, Abakaliki,
Ebonyi State, Nigeria

ABSTRACT

Aluminium Zinc Sulphide (Al_2ZnS_4) Ternary Thin Films were successfully grown on the substrates by Solution Growth Technique (SGT). The sources of Aluminium, Zinc and Sulphur ions are Aluminium Chloride, Zinc Sulphate, ethylenediamine tetraacetic acid (EDTA), concentrated ammonia solution and thiourea. The films were annealed at 300°C for 2 hours and characterized by UV-VIS-NIR Spectrophotometer in the wavelength range of 300nm-1000nm to determine the optical properties of the films. The optical transmittance was obtained directly by the Spectrophotometer. Other optical properties were determined by theoretical calculations. The average energy band gaps of the films grown at two different temperatures are 3.63 and 3.77eV for different dip times. The other optical properties have been reported. From the results, the wide direct energy band gap exhibited by the films reveals that the films are suitable materials as window layer in solar cells fabrication. The high transmittance exhibited by the films reveals that the films are promising material for the construction of roofs and walls poultry houses. This will provide the needed heat required for warming of young chicks and has the potential to reduce the cost of energy consumption associated with the use of electric bulbs, stoves and lamps which will produce the needed heat to warm young birds.

Key words: Aluminium, Transmittance, Band Gap, window Layer, Solar Cells, Thin Films,

INTRODUCTION

The new ternary thin films of Al_2ZnS_4 are one of the essential ternary compounds for optoelectronic device applications. The deposition and study of the properties of ternary chalcogenide compounds and their application in solar cells, light emitting diode and other optical devices has increased in recent years (Ortega- Lopez et al; 2003). Ternary compounds are recommended as suitable materials for window layer in solar cells (Woon-Jo and Gye-Choon, 2003). Ternary compounds have been deposited by advanced technological methods but a simple and low cost solution growth technique improves much better (Rao, 1986). Solution growth technique is an interesting technique which produces high quality semiconductor thin films (Wang et al; 1999). This technique has been employed in producing emerging materials for solar cells, protective coatings, solar thermal control in buildings which was adopted by industries (Chopora et al; 1985, Nnabuchi, 2005, and Ezema et al; 2009). It is also the technique for depositing

many films at a single run.

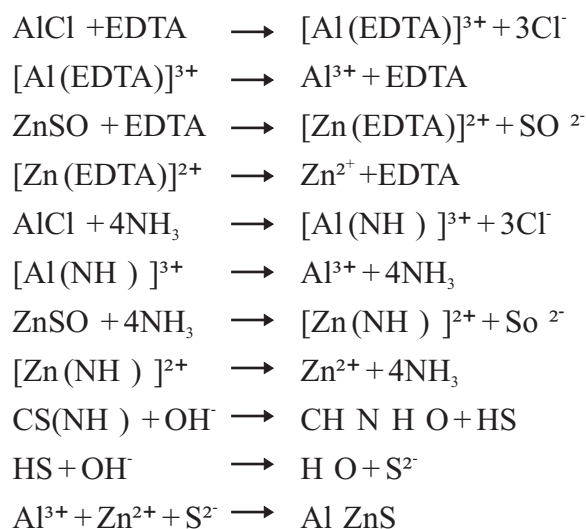
MATERIALS AND METHODS

The ternary thin films of Aluminium Zinc Sulphide (Al_2ZnS_4) were deposited using solution growth technique. Prior the deposition, glass substrates (slides) degreased in trioxonitrate (V) acid for 24 hours, washed with detergent, rinsed in de-ionized water and dried in air. The purpose of degreasing the surfaces is to provide nucleation centers for the growth of the films, thereby yielding adhesive uniformity grown films. The films were grown in different concentrations 0.1M, 0.3M and 0.5M; at different temperatures 300K and 333K for different dip times 2 hours and 24 hours. The chemical bath for the deposition of Al_2ZnS_4 contains 16mls of 0.1M of $AlCl_3$, 16mls of 0.1M of $ZnSO_4$, 10mls of 0.1M of EDTA, 16mls of 0.1M of $CS(NH_2)_2$ and 10mls of concentrated aqueous ammonia (NH_3) in a 100ml beaker. The same volume of mls of solution was used for the deposition of films at the concentrations of 0.3M and 0.5M respectively. The mixture was



stirred with magnetic stirrer for the uniformity of the solution. EDTA and ammonia solution were used as a complexing agents which slow down the in order to eliminate spontaneous precipitation. The substrates were dipped into the reaction baths vertically with help of the perforated synthetic foam. The substrates were allowed to remain in the bath for different dip times 2 hours and 24 hours. The films were washed in de-ionized water and dried in air after each deposition. After the deposition, the films were annealed at temperature of 300°C for 2 hours and characterized for optical transmittance using UV-VIS-NIR Spectrophotometer.

The reactions involved in the complex ion formation and film deposition processes of the ternary thin films grown are as follows:-



RESULTS AND DISCUSSION

Figs.1 and 2: depict the Plots of $(\alpha h\nu)^2$ as a Function of Photon Energy at Different Concentrations at 300K and 333K.

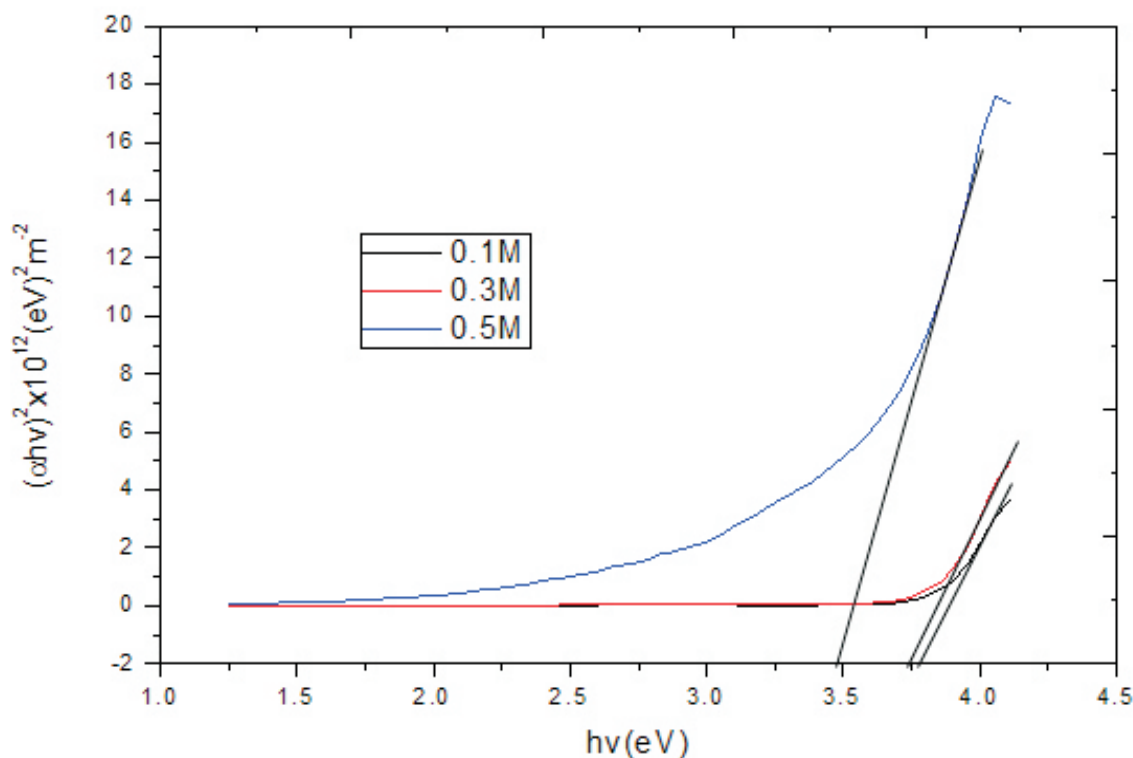


Fig.1: Plots of $(\alpha h\nu)^2$ as a Function of Photon Energy at Different Concentrations at 300K

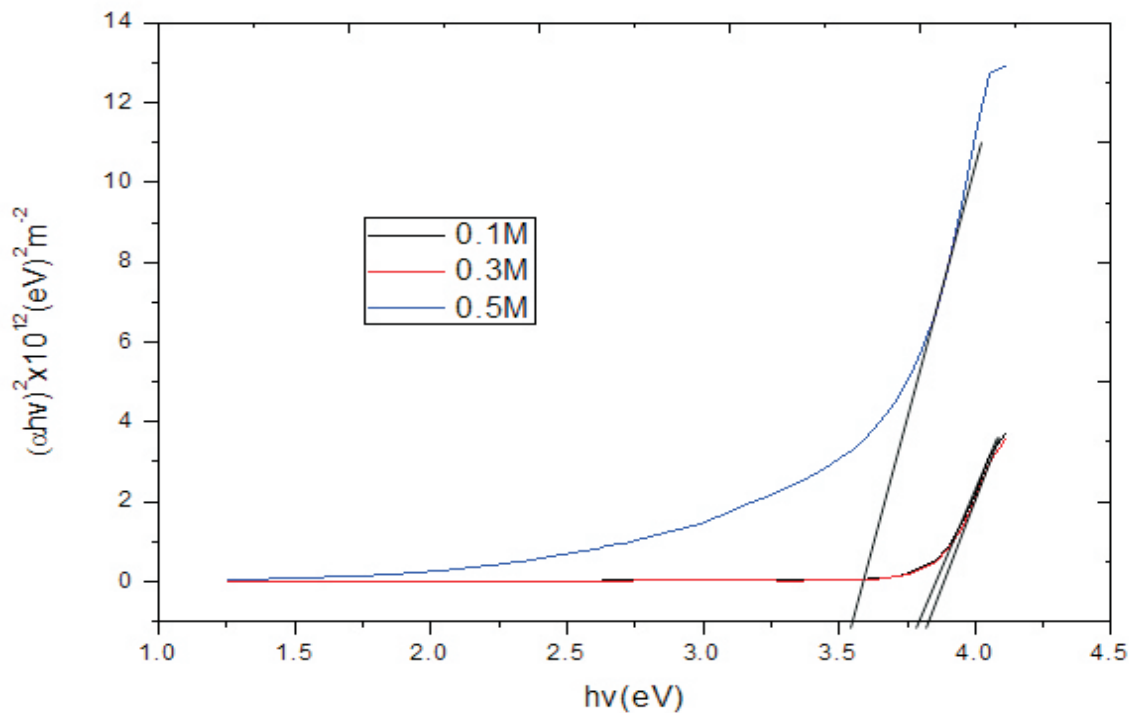


Fig.2: Plots of $(\alpha h\nu)^2$ as a Function of Photon Energy at Different Concentrations at 333K

Figure 1. shows the plots of $(\alpha h\nu)^2$ as a function of $h\nu$ for the determination of band gap of Al_2ZnS_4 thin films deposited at 300K. The direct energy band gap values are 3.80eV, 3.70eV and 3.40eV for 0.1M, 0.3M and 0.5M respectively. Clearly, a band gap narrowing can be observed with increase in concentration. The determination of band gap of Al_2ZnS_4 thin films at 333K was achieved by plotting the graph of $(\alpha h\nu)^2$ as a function of $h\nu$ at different concentration (Fig. 2). As observed in fig.2, the band gap vary in the same manner, decreasing from 3.85eV for 0.1M to 3.80eV for 0.3M and 3.65eV for 0.5M. These band gap values are higher compared to that of Uhuegbu (2007) for CuZnS and FeZnS thin films. However, they are in agreement with that of Kumar, Sharma, Gaur and Sharma (2008), Shinde, Ahirrao and Patil (2011), Igweoke, Augustine, Idenyi, Okorie and Anyaegbunam, (2018) for binary ZnS thin films. The wide direct band gap exhibited by these films make them good as window layers in heterojunction solar cells (Petkov, Todorov, Kozhuharova, Tcky, Cernoskova and Ewen, 2006; Agbo, 2011). Therefore, Al_2ZnS_4 thin films deposited and characterized may be used as alternative for possible incorporation in CIGS solar cells.

CONCLUSION

New ternary thin of Aluminium Zinc Sulphide grown have been successfully deposited on glass substrate using solution growth technique. The optical characterization was examined using UV-VIS-NIR Spectrophotometer. The result reveals that the wide energy band gap exhibited by the films

make them suitable photovoltaic and optoelectronic applications.



REFERENCE

- Agbo, P. E. and Nnabuchi, M. N. (2011). Core-Shell TiO_2/ZnO Thin Film: Preparation, Characterization and effect of temperature on some selected properties, *Chalcogenide Letters*, 8(4), 273-278.
- Igweoke, A.E., Augustine, C. Idenyi, N.E., Okorie, B.A. and Anyaegbunam, F.L.C. (2018). Influence of processing conditions on the optical properties of chemically deposited zinc sulphide (ZnS) thin film, *Materials Research Express*, 5, 1-12.
- Kumar, V., Sharma, M.K., Gaur, J. and Sharma, T.P. (2008). Polycrystalline ZnS thin films by screen-printing method and its characterization, *Chalcogenide Letters*, 5(11), 287-295.
- Nnabuchi, M. N. (2005). Bandgap and optical properties of chemical bath deposited magnesium sulphide (MgS) thin films, *Pacific Journal of Science and Technology*, 6(2), 105-110.
- Woon-jo, J. and P.Cye-choon (2003). Structural and Electrical Properties of CuGaS_2 Thin Films by Electron beam Evaporated Solar Energy material and Solar cells, 75,93- 100
- Petkov, K., Todorov, R., Kozhuharova, D., Tcky, I., Cernoskova, E. and Ewen, P.J.S. (2006). Changes in the physiochemical and optical properties of chalcogenides thin films from the system of As-S to As-S-Ti, *Journal of Material Sciences*, 39:961.
- Uhuegbu, C.C. (2007). Growth and characterization of ternary chalcogenide thin films for efficient solar cells and possible industrial applications, Ph.D Thesis, Department of Physics, Covenant University, Otta, Ogun State. 61-76.
- Shinde, M.S., Ahirrao, P.B., Patil, I.J. and Patil, R.S. (2011). Studies on nanocrystalline ZnS thin films prepared by modified chemical bath deposition method, *Indian Journal of Pure and Applied Physics*, 49, 765-768.
- Wang, C; Qiaro, X; Zhang W.X; Xie, Y. and Qian Y.T. (1999). *Material Research Bulletin*, 34, 105-



EFFECT OF PLAY TEACHING STRATEGY ON SKILLS DEVELOPMENT OF CHILDREN IN EARLY CHILDHOOD EDUCATION (ECE) IN EBONYI STATE.

Ikoro, Stanley Ibekwe, Ph.D.

and

Onwe Ignatius, Ph.D

Ebonyi State College Of Education Ikwo,
Ebonyi State Nigeria.

Abstract

This study was on effect of play teaching strategy on skills development of children in early childhood education (ECE) in Ebonyi State .The descriptive survey design was used, and the sample size was 304 teachers, made up of 62 males and 242 females. Four research questions and two hypotheses guided the study, while four points Likert scale questionnaire was developed by the researchers which had a grand reliability index of 0.89 and was used for data collection. Mean and standard deviation were used to answer the research questions while the Pearson product moment correlation coefficient was used to test the hypotheses. Based on the findings of the study, the researches recommend among other things that; The government, school management and the community should jointly provide adequate materials and conducive play environment that will promote play teaching strategy for the promotion of literacy, numeracy and social development of the child

Keywords: Early childhood development, childhood education, play teaching strategies and skill development

Introduction

In Nigeria, the Federal Government paper, as contained in the National Policy on Education (2013) stated that the Early Childhood Education, which is pre-primary school education should admit children at the age of 5 years. This means that, it is a one year programme preparatory for entry into primary one, which should be play activity based in order to achieve the all-round development of the children. It has been observed that through play children explore their world, learn about science, technology, and mathematics (STEM), and have ample opportunity to practice literacy and language skills. With the provision of necessary learning materials, nature corner and mini-learning centers in the school. The children can learn to navigate difficult social situations and develop problem-solving skills. Also they can learn that they can be anyone they want to be and that imagination is a powerful tool. It has been observed that children who are able to sustain pretend play roles are able to work better with their peers and solve a lot of problems, no matter where they are. The ability of children to get along with others and to self-regulate himself or herself are important skills for pupils in Early childhood care education, to learn before they enter primary one. As the child

progresses through each experience the expectation for attending to large group lessons for longer periods of time increase. Free play, especially positive peer interactions during free play can help build important self-regulation skills. According to Lindsey and Colwell (2013), play enhances cognitive, affective and psychomotor development of the child. It is on the premise of increasing lack of play, and the importance placed on direct instruction for our pupils in early child care education programme that spurred the present researchers, to investigate on the "Effect of Play-Teaching Strategy on skills Development of pupils in Early childhood care Education in Ebonyi State.

Statement of the Problem

It has been observed that there is increasing lack of play teaching method in our Early childhood care Education classes. Currently, importance is placed on direct instruction with few teaching aids, thereby promoting cognitive ability only in the pupils. Also, the rigidity of the primary school curriculum is used in most of the preprimary school in Nigeria including Ebonyi State. Similar it is prevalent in the Early childhood care Education where free play method is not a priority, rather the pupils are engaged more with mental task, leaving the areas of social,



emotional and expressive development. Therefore, it seem to the present researchers that most schools lack the knowledge and skills on how to effectively use play method to facilitate teaching and learning in the Early childhood care Education centers, hence this study on Effect of play Teaching strategy on skill development of children in Early childhood Education in Ebonyi State.

Purpose of the Study

The main purpose of the study is to investigate the effect of play-teaching strategy on skill development of children in Early childhood Education in Ebonyi State. Specifically the study seeks to find out;

1. Whether the Teachers of Early childhood Education (ECE) understands what play teaching method is all about.
2. The extent the ECE teachers use play method in teaching their pupil in Ebonyi State..
3. The effect of play method on ECE Childs ability to interact positively with peers.
4. How play method could affect the development of language and vocabulary skills.

Significant of the Study

It has become necessary that this study be carried out, because of its various significance. Firstly, the result of the study will establish empirical justification for the topic, hence advance the frontier of knowledge of childhood care Education in Ebonyi State in particular and Nigeria in general. The findings of this study will be beneficial to the Government, Education Boards and School Management, Teachers, Researchers, Parents-Teachers Association (PTA) and the general public. To the Government; the study will spur the authorities to organize workshop, seminars or in service courses for the teachers of Early childhood Education. Also the Education board and the school managements will be motivated to supply the necessary materials needed for effective play teaching methods, such as, toys, balls, blow-blow, different shapes and alphabets and so on. The teachers will equally benefits from the result of this study by being exposed to the types of play and their relationship to the developmental aspects of the child. Equally, the findings of this work will serve as an empirical evidence or bases upon which other researcher could continue to develop. Also the

parents teacher Association and the general public will rely on the findings of this study to support the Early childhood care Education through the supply of necessary materials/equipment that will promote effective teaching and learning through play.

Scope of the Study

The study is limited to "Effect of play teaching strategy on skills Development of children in Early childhood Education in Ebonyi State. It covered all Public preprimary school teachers in three education zones of Ebonyi State-Research Questions

Research questions

1. To what extent do the teachers of Early Childhood Education understand what play- teaching strategy is all about?
2. To what extent do ECE teachers use play-teaching strategy in their school?
3. What is the effect of play teaching strategy on ECE child's ability to interact positively with peers?
4. How can play method affect the language, numeracy and vocabulary skills development of a child?

Hypotheses

The hypotheses was tested at 0.05 significant level

HO1: There is no significant relationship between the effect of play teaching strategy and the ECE child's ability to interact positively with peers.

H02: There is no significant relationship between the effect of play teaching strategy and the language, numeracy and vocabulary skills development of the child.

Review of Related Literature

This section presents the review of the related literature for the study. All the reviewed materials have been organized and presented under the following heading and subheadings.

Conceptual Framework

Concept of Early Childhood Development.

Early Childhood Education

Play teaching strategy

Type of play



Theoretical Framework

Theoretical perspective of play teaching strategy by:

Jean Piaget (1962)

Dewey (1966) and

Burdette and Whittaker (2005)

Empirical Studies.

Concept of Early childhood Development

Early Childhood Development can be viewed as improving the well-being of young children with particular emphasis on the quality of educational and developmental services for children from birth to age 5+ (UNESCO, 2019). Furthermore, early childhood development refers to the physical, cognitive, linguistic and socio-emotional development of a child from the prenatal up to age 5 above. It is the key to a full and productive life for a child and to the progress of a nation. It is critical stage of development that forms the foundation for children's future well-being and learning. According to National Policy on Education (2014), Early Childhood Development is a process which activities are designed to meet the child's multiple needs such as health, nutrition, and psycho-social stimulation as well as strengthening the environment in which the children live. Early childhood development (ECD) is concerned with the care and education of children aged 0-6years. All over the world, it is recognized that deliberate efforts must be made to ensure the provision of quality care for children at this age. Universal Basic Education (UBE) Act of 2004, which placed Early Childhood Education (ECE) into the main stream. These laws and acts provided the interventions and actions that will improve the wellbeing of the Nigerian children, such as the planning and institutionalization of ECE (Federal Ministry of Education, 2019).

Early Childhood Education

Early childhood education is a starting point for a child's development and the key foundation of Nigerian Educational system. The Early Childhood Education is also Known as preprimary education, because it is the preparatory ground for the pupils aged 4-5+years or one year period before entering

into primary one (F-R-N 2013). Therefore, the preprimary education is established in most countries to make the provision for early child hood education programme of various types for children below the official school age 6 years like in Nigeria. The Federal Republic of Nigeria (2013) stipulates that it should be included in the mainstream Education. The Early childhood education can be traced to the efforts of prominent European education experts like: John Amos Comem'us (1590-1690), J.J. Rousseau (1782-1788), Johann Heinrich Pestalozzi (1748-1827) and many others who championed the right of children to early education. The first pre-primary education was founded in 1816 by Robert Owen who was interested in ensuring that the children of the rich and the poor have the same opportunity and privilege to be educated. From then many nations brace it and indeed all over the world. In Nigeria, the Federal Military Government gave official recognition to Early Childhood Education in the National Policy on Education (1977), revised first in 1981 and the latest revision was in 2012. In view of this, all the public primary schools in Nigeria have pre-primary education section. In other words the education system in Nigeria is 1-6-3-3-4 education system impliedly, one (1) is for one year preprimary school, 6 is for the 6years primary 1 to 6; 3 means 3 years Senior Basic education (Junior Secondary one to three) and another 3 is for the 3years Senior Secondary School, and 4 is the four years University program.

Play Teaching Method

Play is essential to the holistic development of children and effective learning. In other for children to develop to their full potential and to learn effectively, children should be provided with play activities which can either be structured or unstructured. Play is critical to the holistic development of children in areas such as:

Early brain development which is very rapid during the first five years of human life. It has been observed that play activities help the development of the brain by stimulating the brain through the formation of connection between the nerve cells.

Fostering opportunities to develop large and small motor skills as well as coordination, balance and muscle tone. (Ginsbury, 2017).



Social interactions and social skills. The more children are enjoyed in play, the more interactions they form and the better the quality of these interactions become (Stonebridge, 2015). Making and practicing new sounds. They try out new vocabulary on their own with friends, developing their natural potentials through play.

Developing new competencies that lead to enhanced confidence and the resilience they will need to face challenges. Stimulating children's imagination and this happens when children create stories around them

Summarily, play is a child's natural way of exploring the world they live in, and very effective natural ways for them to learn.

Types/forms of play

The followings are some types of play children engage themselves (UNESCO, 2019)

Solitary play:- children play on their own in this type of play; Onlooker play:- here children relate to others watching others; Parallel play:-children play next to each other and idea of property rights, by saying "mine" very often; Association play;- children are more interested in others; Social play:- children share toys and ideas using moral reasons; Physical play:- in this type children run, jump, dance and play games; Constructive play:- this is creating, drawing, painting, building blocks; Expressive play:- children play with water and clay, and learn to express feelings; Pretend/Fantasy play:- here, children think in different ways, assume adult roles, and use new words; Co-operative play:- children originate group play, assume leadership roles, play games with rules and learn that life has rules.

Theoretical Frame Work

This study is anchored on the theoretical perspective of the following theorist.

According to Yvgotsky theory of the zone of proximal development; scaffolding allows children to build on what they already know to deepen their existing knowledge and extend their skills. He believes that children can scaffold for themselves through pretend play.

Jean Piaget (1992) asserts in his theory that

development in children is mostly a function of play. That play is integral to the development of intelligence in children. That as the child matures, their environment and play should encourage further cognitive and language development. Also Dewey (1966), believed that through play based teaching and learning context, children are given the opportunity and they gain new information and concepts, thus enabling their intellect to be engaged and to support progress. All these theories are appropriate and relevant to this study which is Effect of play teaching strategy on skill development of children in early childhood education.

Empirical Study

Some empirical studies were reviewed as stated here under:

Lynch (2015) conducted a netnographic study of early childhood teachers to ascertain how the diminishing time afforded to free play in preprimary classroom has affected children they teach. Nearly all the teachers in her study believed that children benefit socially from free play, and that learning take place as they are playing and demonstrating what they have learned through play.

Also, Lindsey and Colwell (2013) conducted a two-year study of 122 preschool - age children (57 boys and 65 girls) from mostly middle - upper - middle class families in USA, to ascertain how different types of play affect children's "Affective social competence (ASC) skills. Questionnaire, interviews, and observation were used in the findings. The data collected within the two years were analyzed using regression analysis, which showed a correlation between emotion, knowledge, emotional regulation, emotional expression and affective social competence skills through play.

Equally, Veiga, Leng, Cachucho, Ketelaar, Kok, Knobbe, Neto and Rieffe (2017) conducted a study of 73 Portuguese pre-primary pupils (44 boys and 29 girls) in order to determine whether one type of play is more important than others in developing social competence. They recorded the children's play for three minutes at a time by coding the type of activity such as talking or playing. They categorized the play into five types: fantasy play, role play, exercise play, rough and tumble play, and others. From their study they found out that children who spend more time interacting in social group within



their free play activities were more socially competent than those who spent time playing alone. Also that the play environment and quality of play interactions have a greater effect on social and academic outcomes than any one type of play.

In their own study Li, Hestens and Wang (2016) examined the relationship between children's pretend play and the development of affective social competence skills. They chose to observe children at play outdoors because of the lack of research available on children's play in outdoor settings. 28 children from the child care centers in the United States of America were used for the study. With the social rating system and teacher's completed reports, it was found that both social and abstract pretend play positively correlated with an overall higher social skill rating system score. They recommended that both teachers and parents should actively promote social pretend play activities to build important skills in the children on effect of play on vocabulary acquisition and literacy Han, Moore, Vukelich and Buell (2010) used 49 children in their study, and tested two vocabulary teaching intervention through play. They discovered that additional time for play helped children use the words they learnt in the intervention, through acting out stories and creating language scenarios. The play time improved their memory and recall and created a connection between literacy and play.

Furthermore, Dickinson and Porche (2011) conducted a longitudinal study to determine how the quantity and content of preprimary child play intervention predicts language and reading outcomes. 83 four years old children were used for the study. Observation, interviews and audiotapes of teacher-pupils interaction during free play were used significant correlations were found between literacy outcomes and the free play they were exposed. They concluded that language development begins in free play. All these empirical studies are relevant to this present work.

Summary of review of Related Literature

The review looked at the concept of Early Childhood development, play teaching strategies, types of play. Equally, the theoretical perspectives of play teaching strategies were reviewed which includes the theory of Yygotzky, Jean piaget and Dewey. Also empirical studies of the following authors were reviewed; Lynch (2015), Lindsey

etal(2013), Veiga etal(2017), Li etal(2016), Han etal(2010), and Dickson etal(2011). However, it does appear from the available literature that no work has been done on the effect of play learning strategies for skill development in Early childhood education for preprimary schools in Ebonyi State, hence the present study.

Methodology

The procedures adopted in the study were: Design of the study, Area of the study, population of the study sample and sampling techniques, instrument for data collection, validity of instrument, reliability of instrument, method of data collection and method of data analysis.

Design of the study

The researcher used a descriptive survey design to establish opinion and knowledge on the area of this study. A descriptive survey design attempts to describe, explain and interpret conditions of the present as it is. Therefore, it is appropriate to use it here hence the researcher assesses the effect of play teaching strategy on skill development of children in Early childhood Education in Ebonyi State

Area of the study

This study was carried out in Ebonyi State. Ebonyi State has three Education zones namely, Abakaliki with four Local Government Areas, Onueke with four LGAs and Afikpo with five LGAs. The capital of Ebonyi state is Abakaliki, and has both urban and rural settings. The choice of Ebonyi State is premised on the fact that no research work on the present study has been conducted in the area.

Population of the study

The population of this study composed of all the preprimary school (Early childhood Education) teachers in Ebonyi State. The population is restricted to those in public primary schools that have preprimary sections, numbering fifty two (52) with population of 304 teachers.

Sample and Sampling Technique

There was no sample. The whole of 304 teachers were used, which was made up of 62 males and 242 females

Instrument for Data Collection.

The researcher used self developed questionnaire titled " Play-Teaching Strategy on skill



Development Questionnaire (PTSSDQ) to collect primary data from the respondents. The questionnaire has two sections; section A is about profile of the respondents while section B are questions based on the research questions. The questions are arranged in likert scale format of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) with corresponding rating scale of 4, 3, 2 and 1 respectively. Any item that has a score of 2.5 and above was or agreed, while the item below the score of 2.5 was disagree. The 2.5 was arrived at thus: $-4+3+2+1=10-4=2.5$

Validity of the Instrument

The instrument was subjected to both face and content validity by presenting the draft copies to the three experts, one in the Faculty of Education, and others in Measurement and Evaluation from Ebonyi State University Abakaliki.

Reliability of the Instrument

The reliability of the instrument was determined by a pilot test exercise with 30 teachers randomly selected from Abakaliki urban, who were not part of the study sample. The instrument was administered to them at two intervals and the results subjected to internal consistency using cronbach Alpha method, and the reliability index for subscale 1, is 0.71, subscale 2 is 0.83, subscale 3 is 0.86 and subscale 4, is 0.78. While the reliability co-efficient of the whole item summary is 0.89, indicating that the instrument is highly reliable (see appendix 11)

Method of Data Collection

The copies of the questionnaire were administered to the 152 teachers used as sample of the study. The researcher will be assisted by three research assistants in the administration of the questionnaire directly to the respondents. It will be filled and

collected back within two days.

Method of Data Analysis

In analyzing the data, the researchers used of mean scores and standard deviation to answer the four research questions stated in the "study. A bench mark of 2.5 and above was used as bases for acceptance or otherwise of the statement. While Pearson Product Moment Correlation Coefficient statistics was used to test the null hypotheses at 0.05 significant level.

Expected Results

This study is expected to

- Provide empirical documents for teachers and school management on effective use of play teaching method.
- The government will supply through Education Board some materials such as, toys, blow-blows, balls, shapes and alphabet to Early Childhood Education Schools.
- Serve as ready materials for effective teaching and learning through play.
- Enhance the early childhood children skill mentality and all round development
- It will cause a paradigm shift from teacher centered teaching and learning to children centered learning, demonstration and creative learning It will also popularize the use of play teaching methods more in the public Early Childhood Education center in Ebonyi State.

Data Analysis

This chapter presents that data analysis based on the research questions and hypotheses that guided the study. The data and the results of the analysis are presented in table, in order of the research question

Research question one

To what extend do teachers of early childhood Education (ECE) uses that play teachings strategy is all about?

Table 1: Means ratings and standard deviation of male and female ECE teachers on their understanding of play teaching strategy.



S/ N	Play-teaching strategy means	Male Teacher (31)			Female Teachers (121)		
		Mean \bar{x}	SD	Dec	Mean \bar{x}	SD	Dec
1.	The teacher playing with pupils when teaching	1.25	1.07	Low extent	1.32	1.12	Low extent
2.	Providing learning materials for pupils to explore/play with	2.53	0.91	High extent	2.62	0.88	High extent
3.	Pupils playing in groups inside and outside the classroom	2.21	0.98	Low extent	2.12	1.00	Low extent
4.	Designing learning environment with materials for pupils to explore under the guide of a teacher.	3.60	0.49	High extent	3.20	0.58	High extent
5.	The teacher observe the pupils playing, while he records the activities	2.80	0.72	High extent	2.85	0.68	High extent
	Grand mean and SD	2.47	0.96	Low extent	2.43	0.97	Low extent

The data in table 1 above shows that item 2 had Mean 2.53 and SD 0.91 for male and Mean 2.62 for females. Also item 4 had for male 3.60 Mean 0.49 SD and female Mean 3.20 and SD 0.58. While item 5 had for male 2.80 mean and SD 0.72 and female 2.85 mean and SD 0.68. All indicating high extent of understanding. But items 1 and 3 had their mean less than 2.50 indicating low extent of understanding. Also the grand mean for both male and female are mean 2.47 and SD 0.96 and 2.43 mean and 0.97 SD respectively. Showing that both male and female ECE teachers have low understanding of what play teaching strategy is all about.

Research question two

To what extent do early childhood education teachers (ECE) use play teaching strategy in their school?



Table 2: Mean ratings and standard deviation of male and female ECE teachers on the use of play teaching strategy in their schools.

S/N	As early childhood Teachers, 1 use play teaching strategy	Male Teacher (31)			Female Teachers (121)		
		Mean \bar{x}	SD	Decision	Mean \bar{x}	SD	Decision
6.	Always	2.20	1.14	Low extent	2.10	1.20	Low extent
7.	Sometimes	2.06	1.18	Low extent	1.98	1.26	Low extent
8.	During recreation only	2.22	1.16	Low extent	2.15	1.15	Low extent
9.	Seldom	3.02	0.97	High extent	3.00	0.98	High extent
10.	During songs and rhymes only	2.61	1.11	High extent	2.78	1.09	High extent
	Grand mean X and SD	2.48	1.05	Low extent	2.42	1.10	Low extent

The data in table 2 above reveal that items 9 and 10 are the extent male and female ECE teachers use play teaching strategy in schools which are high; whereas items 6, 7 and 8 for both male and female ECE teachers recorded mean of low extent. Generally, the ground mean for male is 2.48 and SD 1.05 and female has 2.42 and SD 1.10 indicating low or none usage of play teaching strategy in their schools.

Research question three

What is the effect of play strategy on the early childhood care Education child's ability to interact positively with peers?

Table 3: mean ratings and standard deviation of male and female early childhood Education (ECE) teacher on the effect of play strategy on ECE child's ability to interact positively with their peers.



S/N	As early childhood Teachers, 1 use play teaching strategy	Male Teacher (31)			Female Teachers (121)		
		Mean \bar{x}	SD	Decision	Mean \bar{x}	SD	Decision
11.	The child learns faster through play, cognitively and socially	3.35	0.53	Accept	3.64	0.41	Accept
12.	The child learn to work or explore in group of others	2.95	0.56	Accept	2.81	0.62	Accept
13.	They teach one another as they play.	3.65	0.41	Accept	3.61	0.46	Accept
14	Friendship is developed	2.92	0.58	Accept	2.90	0.60	Accept
15.	They learn to tolerate and appreciated one another.	3.60	0.43	Accept	3.55	0.48	Accept
	Grand mean X and SD	3.27	0.58	Accept	3.30	0.55	Accept

The results in table 3 show that all the items were rated above 2.50 in all the columns. Both the male and female ECE teachers accepted that all the items are the effect of play teaching strategy on ECE child's ability to positively interact.



Research question 4

How can play teaching strategy effect the language, numeracy and vocabulary skill development of a child?

Table 4: Mean ratings and standard deviation of male and female ECE teachers on the effect of play teaching strategy on the language, numeracy and vocabulary development of a child.

S/N	Play teaching strategy can affect language, numeracy and vocabulary development	Male Teacher (31)			Female Teachers (121)		
		Mean \bar{x}	SD	Decision	Mean \bar{x}	SD	Decision
16	By the use of Hopscotch. Hopscotch is numbers and alphabets games drawn on the ground.	3.64	0.63	Accepted	3.47	0.73	Accepted
17							
18	Use of numbers and alphabets in songs and rhymes.	3.56	0.65	Accepted	3.51	0.66	Accepted
19	Reading cut out or flash cards of numbers and alphabets.	3.50	0.70	Accepted	3.31	0.76	Accepted
20	Use of "pretend" role play						
	Reading of pictures, calendar and drawing.	3.21	0.81	Accepted	3.20	0.81	Accepted
		3.48	0.73	Accepted	3/23	0.78	Accepted
	Grand mean \bar{X} and SD	3.48	0.70	Accepted	3.34	0.75	Accepted

Table 4, Show all the items as being effective since all the mean scores are above the criterion mean of 2.50.

Hypothesis 1:

There is no significant relationship between the effect of play teaching strategies and the ability of the child in early childhood Education (ECE) to interact positively with peers.

Table 5: Relationship between the effect of play teaching strategy and the ability of the child in early childhood education (ECE) to interact positively with peers.



S/N	Variable	N	Mean \bar{X}	SD	R	Significant value
1.	Effect of play teaching Strategy	304	3.042	0.68		0.010
2.	Ability of the child in ECE to interact positively with peers	304	3.012	0.71	0.775	

Correlation is significant at the 0.05 level (2-tailed)
(source: Author's field work survey, 2022).

From the result of the analysis carried out as shown in table 5 above, the value of pearson product moment correlation coefficient between the variable “effect of play tea ching str ategy and ability of the ECE child to interact positively with peers” done at alpha level of 0.05 is 0.775, and this value is closer to the figure plus one than zero, indicating that there is a strong positive correlation between the variables. Meaning that the effect of play teaching strategy has positive influence on the child of early childhood Education to positively interact with their peers.

Furthermore, the significant value of pearson product moment correlation coefficient between the variable “Effect of play teaching str ategy and the variable “ability of the child in early childhood Educaiton (ECE), to interact with peers” is 0.0101 and this value is less than 0.05 indicating that there is linear relationship between the variables. This means that the more the effect of play teaching strategy is improved upon, the more likely the ability of the child in early childhood Education (ECE) in Ebonyi State will be enhanced.

Inferentially, since $p\text{-value} = 0.010 < 0.05$ and it is significant at 95% confidence interval and the value of R is 0.775 indicating strong positive correlation, we reject the null-hypothesis and accept the alternative hypothesis and conclude that; there is significant relationship between the effect of play te aching strategy and the ability of the child in early childhood education (ECE to interact with pears in Ebonyi State, Nigeria.

Hypothesis 2:

There is no significant relationship between th e effect of play teaching strategy and the language, numeracy and vocabulary skills development of the child in early childhood education in Ebonyi State.

Table 6: Relationship between the effect of play teaching strategy and the language , vocabulary skills development of the c hild in early childhood Education.

S/N	Variable	N	Mean \bar{X}	SD	R	Significant value
1.	Effect of play teaching strategy	304	3.01	0.88		
2.	Language vocabulary skills	304	2.98	0.91	0.786	0.032

Correlation is significant the 0.05 level (2-tailed)

(Source: Author's field work survey, 2022).



From the result of the analysis carried out as shown in table 6 above, the value of Pearson product moment correlation coefficient between the variable “effect of play teaching strategy and language vocabulary skill” done at alpha level of 0.05 is 0.786 and this value is closer to the figure plus one than zero, indicating that there is a strong positive correlation between the variables. Meaning that the effect of play teaching strategy has positive effect on the language skills development of the child.

Further more, the significant value of pearson product moment correlation coefficient between the variable “effect of play teaching strategy” and the variable vocabulary skill development” is 0.032 and this value is less than 0.5 indicating that there is linear relationship between the variables.

This means that the more the effect of play teaching strategy is improved upon, the more likely the language skills development of the child will be enhanced in Ebonyi State, Nigeria.

Inferentially, since $p\text{-value}=0.032 < 0.05$, and it is significant at 95% confidence interval and the value of R is 0.786 indicating strong positive correlation, we therefore reject the null-hypothesis and accept the alternative hypothesis and conclude that, there is significant relationship between the effect of play teaching strategy and vocabulary skill development of the child in early childhood Education in Ebonyi State, Nigeria.

Discussion of the Findings

With reference to the first research question which sought to find out what do Early Childhood Education teachers understand what play teaching strategy is all about. The respondent generally do not understand what it is hence their grand mean of 2.47 for Male and 2.43 for Female. This confirms the statement of Gray (2011) that teachers spend more time in direct instruction and less time in free education play, hence they do not understand what it is all about. He also asserts that preprimary school teachers are more academically focused. Then the result from the research question two reveal that the Early Children Education teacher do not use play teaching strategy to deliver their lesson or that they seldom use it except at recess times. Because of decreasing support for play in early childhood programme play quality among early childhood education diminishing to the lowest levels (Bedrova,

Germeroth and Leong, 2011). The statement of Bodrova et al is in conformity with the findings of the study. On the effect of the play strategy on the early childhood education Child's ability to interact positively with peers, the findings show that the child interact effectively during play. This is in agreement with Lynch (2015) that all the teachers in her study believed that children benefit socially from free play. This is in conformity with Veiga et al (2017) that children who spent more time interacting in social group within their free play activities were rated high, and so socially interacts better.

Equally the findings of the result in table 4, show that play teaching strategy affect the language, numeracy and vocabulary development of the child; this is in consonance with the findings of Stagnitti, Oconnor and Sheppard, (2012) who state that language abilities increase when children were taught to play. Corroborating the above statement, Ham et al (2010) assert that play help the children to use the words learnt, to act out stories and create language scenarios, and the play time improve their memory and recall and create a connection between literacy, even numeracy and play. On the difference between that mean ratings of male and female ECE teachers on the effect of play teaching strategy on the child's ability to interact positively with peers as tested in hypothesis 1, table 5 reveal that there is significant relationship between the effect of play teaching strategy and the ability of the child in early childhood education (ECE to interact with peers in Ebonyi State, Nigeria.

This is in conformity with Bulotsky et al (2014) that there is relationship between interactive peer play and academic skills.

Also, the table 6 of the hypothesis tested show significant relationship. Therefore, there is significant relationship between the effect of play teaching strategy and vocabulary skill development of the child in early childhood Education in Ebonyi State, Nigeria.

This implies that the responses of the teachers are in one accord. This finds are in line with Lewis (2000) who found a correlation between play teaching method and the development of language skills in young children.

5.2.1 Educational Implications of the study

The results from the findings of this study have many implications for both the government,



education managers, stakeholders, parents and the entire citizenry, for all to be aware the important of using play teaching strategy in our pre-primary school, not only in Abakaliki but in the entire Nigeria. Also, it provides platform for all those concerned to understand in detail what play teaching strategy is all about and its contents and implementation procedure as highlighted in the literature reviewed.

The study equally offers itself for adoption, and used elsewhere for implementing play teaching strategy as the best option in the Early Childhood Education centers.

5.4 Conclusion of the study

This study examined effect of play teaching strategy on skill development of children in Early Childhood Education is Abakaliki Local Government Area, Ebonyi State. It was discovered that not all the Early Childhood Education (ECE) teachers understand what play teaching strategy is all about. Because this lack of knowledge they seldom use it in their ECE classes. However most of them accepted that play teaching strategy can positively affect the ability of

the child to interact with peers, can also affect language, numeracy and vocabulary development of the child. It therefore implies that, government and all concerned, should ensure that proper orientation, seminar and workshop be organized for the Early Childhood Education teachers (caregivers) on the use of play teaching strategy in the pre-primary schools in Ebonyi State.

Recommendations

Based on the findings of the study, the researchers made the following recommendations.

1. Governments at all levels should organize regular workshops and seminar for Early Childhood Education (ECE) teachers on play teaching strategy.
2. The government, school management and the community should jointly provide adequate materials that will promote play teaching strategy for the promotion of literacy, numeracy and social development. Adequate and conducive play environment should be design and provided that is safe for the pupils to play.



References

- Burdette and Wihittaker (2005) Play and self-regulation: Lesson from Vygotsky. *America Journal of play*. 6(1), 111-123. Dewey.J. (1966) *experience and Education*. New York: Macmillan.
- Dickinson D.K. and Porche M.V. (2011). Relation between language experiences in preschool Classrooms and children's Kindergarten and fourth-grade language and reading abilities. *Child Development Journal*, 82(3) 870-886.
- Federal Republic of Nigeria (1977). National Policy on Education Lagos: Nigerian Educational Research and Development Council (NERDC)
- Federal Republic of Nigeria (2013). National Policy on Education Abuja: Nigerian Educational Research and Development Council (NERDC)
- Federal Republic of Nigeria (2013). National Policy on Education Abuja: Nigerian Educational Research and Development Council (NERDC)
- Federal Republic of Nigeria (2013). National Policy on Education Abuja: Nigerian Educational Research and Development Council (NERDC)
- Ginsbury J.I.(2017). *Development of large and small motor skills in children*. New York: Makpress Lindsey EW, and Colwell MJ (2013). *Pretend and physical play: Links to preschoolers affective Social competence*. *Merrill-Palmer Quarterly*. 59(3), 330-360.
- Lynch M (2015), *More play please: the perspective of kindergarten teachers on play in the Classroom*. *American Journal of play*, 7(3), 347-370.
- National Policy on Education (2014). *One year preprimary school Education Curriculum*. Abuja: NERDC.
- National Educational Research and Development Council (NERDC) and United Nations Children's Fund (UNICEF) (2019). *Teacher's guide for the implementation of One year Early Childhood Education*.
- Piaget, J. (1962). *Piaget's theory: Handbook of child Psychology*. 1st Edition, New York: Wiley.
- Stonebridge, G(2015). *Early Childhood Care Education*. USA: Mcgrew hill United Nations Educational, Scientific and cultural organization, UNESCO (2019). *Early Childhood Education and Right*. London." Veiga G, Neto C, and Rieffe c (2017). *Preschooler's free play connections with emotional and Social functioning the international Journal of Emotional Education*, 8(1), 48-62.