DEVELOPMENT OF AN INDIGENOUS CERAMICS BEAD MODEL "CLAY FOR PLAY" TO ENHANCE LEARNING CHILDREN WITH LEARNING DISABILITIES

[1]Dokyoung, E. E., [2]Ahuwan, A.M. & [3]Danborno, B.

ABSTRACT

The study developed and designed a four components indigenous Ceramics Bead Model 'Clay for Play' in which the academic and physical components of the model were utilized to design an indigenous Ceramics instructional manual to enhance sensory and visual-perceptual skills, fine motor exercises through tactile experience, and social interaction which many of these children lack. While simultaneously demystifying learning difficulties in arithmetic, counting, addition and subtraction using clay beads for the Clay Mathematical Game. nine (9) children with Learning Disabilities (LD), Cerebral Palsy (CP), Mental Retardation (MR), and Autism in three special schools in Plateau State, Nigeria with varying disabilities, ages, culture, class, environment and educational levels were studied. Three instruments were used for data collection, questionnaire and interview and observation to illicit information from (9) subjects, (3) teachers, nine (9) parents and twenty (20) professionals. The results of the study exposed the usefulness of clay as a veritable tool for expressive therapy, healing trauma and boredom. The 'Clay for Play manual, being the first indigenous ceramics community based rehabilitation resource was appraised a very good intervention available to improve the learning content of LD in Nigeria. This research has opened up a new pathway for ceramists to tackle learning problems; and provide evidence based services for LD in Nigeria

INTRODUCTION

Children with Learning Disabilities (LD) have a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written. The disability may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. Several studies have provided a list of challenges which children with learning disabilities also face, Gina et al (2010) Nwokoro (2007) Schuster (1985) all opined that most persons with learning disabilities have mixed dominance, directional confusion, difficulty in sequencing, distractibility, reversal, poor hand writing, short attention span and behavioural problems which make learning difficult. Feizipoor (2008), Swanson *et al* (1983) indicated that children with LD may suffer from psychological and social problems, such as excessive anxiety, low self-esteem, poor cognitive abilities and poor social judgment. In addition, many persons with disabilities suffer neglect in terms of attendance to formal school, many lack access to education, medical treatment, and employment. Several mentally retarded need vocational rehabilitation but cannot access such service due to non-availability of such programs in their schools or communities (The National Survey of Persons with Disabilities 1996, principal report (2002). According to the United Nations, these children lack 'equalization of opportunities' compared to their peers

The term 'equalization of opportunities' means the process through which the

[1]Helping Hands for Women and Youth Support, Abuja, e-mail: endless aits@vahoo.com
[2]Department of Industrial Design, Ahmadu Bello University, Zaria
[3]Department of Human Anatomy, Faculty of Medicine Ahmadu Bello University, Zaria

various systems of society and the environment, such as services, activities, information and documentation are available to all, particularly to persons with disabilities. It further states that creating a veritable means of livelihood for persons with disabilities is a worldwide demand. Means of livelihood is a function of skill and education, employment opportunities, the socio economic values, culture and health status.

The search for solutions to learning challenges faced by children with LD has attracted specialists in the field of Education, Art, Psychology, Medicine and other professionals over the years. Various intervention strategies are employed to circumvent and alleviate learning problems; while no completely satisfactory solutions have found the desired effectiveness, the field of Art & Education, however, have extensive studies which reveal success on the impact of art as therapy, overall development. Notable among them are the studies of Lowe field and Brittain (1970), Swanson *et al* (1983), Tubbs and Drake (2007) which have proven that fine motor skills are an early prerequisite to the successful completion of such school tasks as drawing, cutting, pasting, printing, or writing.

Fine motor activities involve the small muscles used to move finger and wrists as well as eye hand coordination and coordination of the two hands. Activities to promote fine motor usage include puzzles, finger games, cutting, pasting, painting, buttoning and lacing. While cognitive activities involve play activities that help children practice thinking skills: problem solving (Hemphill 1991; Allen 1985, 1988). The impact of play for children particularly during the early formative years cannot be overemphasized. It is through play - by touching, seeing, tasting, and smelling that a child explores his environment and learns (Barr *et al* 1979). Therefore, play with clay or Ceramics can develop for these children a new image, a new philosophy and even a totally new structure for improved learning content, so that children with LD can be rehabilitated for maximum educational benefits.

It is against this background that this study was conceived. This research was conceived as a result of the obvious lack of multisensory teaching materials which the researcher found missing while on voluntary service in special schools in Plateau State. It was evident that many special schools were unable to deliver due to non-availability of instructional materials. As a result, the development of an indigenous ceramic model was considered of paramount importance.

This study has provided an indigenous resource useful for developing the fine motor skills of children with LD through play with clay. Tubbs and Drake (2007) opined that rolling clay beads allows children with learning disabilities improve cognition, fine motor, and sensory perceptual skills. Therefore, due to the importance and sensitivity of this issue, clay bead making was adopted. The opinion of Tubbs *el al* (2007) that by providing a broad range of tactile, proprioceptive, and visual input, while simultaneously improving the child's self- esteem and sense of independence has shown that Ceramics or clay work has many advantages as a therapeutic medium, and leaves plenty of room for creativity, self- expression and variation of end product.It can be graded to accommodate diverse functional levels and involves a process familiar to most (Tubbs and Drake, 2007). The indigenous instructional ceramics model'. “CLAY FOR PLAY” sought to re-evaluate and reestablish the fact that rolling clay beads allows children with learning disabilities improve cognition, and develop their fine motor, and sensory perceptual skills as they explore with clay. The sensory integration model is most often used with children, particularly those with mild to moderate learning or behavioural problems (Tubbs 2007; Kielhofner 2004). The model proposes that “graded sensory input leads to more normal integration of the senses and thus facilitation of adaptive responses. In addition, the activities should be highly likely to create a

successful experience, thus forming new and more appropriate neural connections; the greater the inner drive to accomplish the activity, the greater the potential for effective neural organization and integration". Baloueff 2003 and Ayres 1987 say that it usually incorporates play, of which crafts, drama, or other creative experiences can be a part. The cognitive model presumes that humans are defined by their cognitive abilities, and that these are demonstrated in their ability to learn, use language, utilize, and change material objects. Task analysis is a key component of this model. A given activity is carefully analysed for process demand; the client's ability to perform that task then indicates the cognitive level at which he or she is functioning. According to this model, illness or dysfunction means inability to learn with resulting limitation in task performance.

Auditory and visual processing: The importance of the Ears and the Eyes

The eyes and the ears are the primary means of delivering information to the brain, a process sometimes called "input." If either the eyes or the ears aren't working properly, learning can suffer and there is a greater likelihood of a learning disability or disorder. Problems in visual perception include missing subtle differences in shapes, reversing letters or numbers, skipping words, skipping lines, misperceiving depth or distance, or having problems with eye-hand coordination. Professionals may refer to the work of the eyes as "visual processing." Visual perception can affect gross and fine motor skills, reading comprehension, and mathematics.

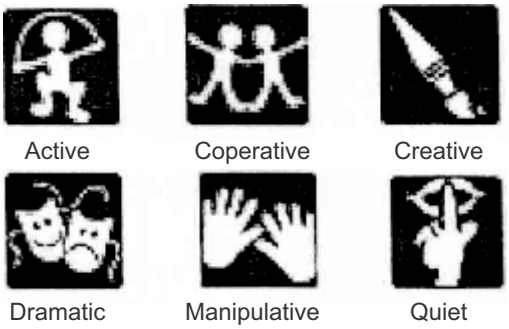
Perceptual Skills and Visual Communication

The first learning experience of a child is through tactile experience. The sense of tasting, hearing and smelling is quite essential to how children respond to their environment. Human visual experience is primary to learning to understand. For a child to perceive, sense must be made of the seeing, and hearing. Poliak (1993) argues that perception involves the reception of sensory impression, remembrance of it and later adaptation and use. Skilled motor activity requires coordination of postural control, righting, balance, orientation and initiation and control of movement for all of which normal proprioception is essential. Poliak further states that when motor development is delayed, this affects play skills such as jumping, skipping, and catching balls.

In a nutshell, Lowenfield and Britain (1970), emphasized the need for a well-balanced educational system in which the due of the total being is stressed, each individuals' thinking, feeling and perception is developed in order that his or her potential creative abilities can unfold. This study has developed and applied the indigenous Ceramics instructional model as a resourceful material for the rehabilitation of children with learning disabilities, with the premise that however dull a child may be, crafts may provide needed escape, personal fulfillment, or an alternative to spoken language (Fidler and Velde 1999).

Factors which affect the development of play

For play to adequately influence learning, children must be freed from the struggle for existence and do what they enjoy doing, not what they must do in order to keep alive. There are certain factors which may hinder or inhibit learning to play. This include, sex, social class, intelligence, culture, and handicap with abnormal motor development, poor auditory skills, gross or fine motor manipulation challenge, lack of balance, poor visual and perceptual skills which are associated with learning disabilities.



The Benefits of Playing with Clay on Learning

Clay is a strong expressive medium and is ideal for enhancing children's development and holistic learning. Working with clay improves dexterity and uses both small and large muscles. Little fingers and hands are strengthened whilst working with clay due to its firm nature and the larger muscles of the arms, back and shoulders are strengthened when rolling slabs or wedging clay. Children of all ages enjoy squishing, squelching, pinching, rolling, poking, stretching and pounding clay. Some children find this particularly soothing and it can be useful for releasing tension or frustration. In addition, ceramics gets children in touch with nature, feeling the earth, understanding where clay comes from contributes to environmental awareness. Although children often work on individual projects, ceramics can also be a very social activity. When appropriate, groups of children with mixed ages and backgrounds are encouraged to work together, which helps promote verbal communication skills, confidence and social skills.

Learning Disabilities can affect learning

Learning in a classroom environment requires sitting still, listening quietly, and concentrating which is tough for children with learning disabilities. Children with learning disabilities are easily distracted by noise, passers-by, or their own thoughts that they often miss vital classroom information. They also have challenges staying focused on tasks that require sustained mental effort. D' Arcy (2007), stated that Learning disabilities affect the brains' ability to receive, process, analyse or store information, and can also make it difficult for a child to read, write, spell or solve mathematical problems.

However, learning disabilities do not include, "...learning problems that are primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage. Learning disorders are caused by a difference in the brain that affects how information is received, processed, or communicated neuroplasticity can change the brain 3/4. Gina (2008) grouped LD into the following types below:

Types of learning disabilities and disorder

Types of learning disabilities are often grouped by school-area skill set or cognitive weakness. If your child is in school, it will probably be apparent if he or she is struggling with reading, writing, or math, and narrowing down the type will be easier.

Motor difficulties and learning disabilities -Motor difficulty refers to problems with movement and coordination whether it is with fine motor skills (cutting, writing) or gross motor skills (running, jumping).

Mathematical difficulties and learning disabilities

Learning disabilities in math vary greatly depending on the child's other strengths and weaknesses. A child's ability to do math will be affected differently by a language learning disability, or a visual disorder or a difficulty with sequencing, memory or organization.

Language difficulties and learning disabilities

Language and communication learning disabilities involve the ability to understand or produce spoken language. Dyslexia is a significant topic in child development as it affects approximately 5% of the population (in the western world). Essentially it is a disorder whereby children fail to attain the language skills of reading, writing and spelling commensurate with their intellectual abilities. Dyslexic children show a range of differences in their language development, from subtle speech impairments to mispronunciations to word-finding difficulties. Poor language development also accompanies general developmental delays such as those found in Down syndrome.

Reading difficulties and learning disabilities

There are two types of learning disabilities in reading. Basic reading problems occur when there is difficulty understanding the relationship between sounds, letters and words. Reading comprehension problems occur when there is an inability to grasp the meaning of words, phrases, and paragraphs.

Writing difficulties and learning disabilities

Learning disabilities in writing can involve the physical act of writing or the mental activity of comprehending and synthesizing information. Basic writing disorder refers to physical difficulty forming words and letters. Expressive writing disability indicates a struggle to organize thoughts on paper.

Mental Retardation or intellectual disability

Intellectual disability, also known as mental retardation, is a term used when there are limits to a person's ability to learn at an expected level and function in daily life. Levels of intellectual disability vary greatly in children - from a very slight problem to a very severe problem. It could take longer for a child with intellectual disability to learn to speak, walk, dress, or eat without help, and they could have trouble learning in school.

Autistic Disorder

Autistic disorder (also called autism; more recently described as "mindblindedness") is a neurological and developmental disorder that usually appears during the first three years of life. A child with autism appears to live in their own world, showing little interest in others and a lack of social awareness. Autistic children often have problems in communication, avoid eye contact and show limited attachment to others, due to an inability to interpret facial expressions or emotions).

Cerebral Palsy

Cerebral palsy is a group of disorders that affect a person's ability to move and keep their balance and posture as a result of an injury to parts of the brain, or as a result of a problem with development. Often the problem happens before birth or soon after being bom. Cerebral palsy causes different types of disabilities in each child. A child may simply be a little clumsy or awkward, or unable to walk at all, might have a delay reaching the motor or movement milestones.

METHODOLOGY

The study designed and developed the 'Clay for Play Model' and tested the 'Clay for Play Manual' on children with learning disabilities. Purposive sampling was utilized for the selection of schools and sample size of the study, because the children were sampled based on a strict criteria i.e. they had to be trainable, with mild developmental disabilities. The population of the study comprised 9 children with learning disabilities from three (3) special schools in Plateau State, Nigeria with Autism, Cerebral Palsy and Mental Retardation and other Developmental Disabilities. 100 % of all subjects either had dyslexia, dyscalculia, poor motor control, short attention span, distractibility, and behaviour problems. The sample were homogeneously mixed and categorized into three groups according to their developmental disabilities; CP, Autistic and Mental Retardation group.

Three (3) instruments were used for data collection in this study; interview, observation and questionnaire. Interview and observation were utilized to test for interest and achievement and to elicit information from subjects. Observation was the main instrument used to assess the children, due to the dyslexic and auditory disabilities of some of the children, their parents were interviewed representing their wards. AOTA structured questionnaire was used for the appraisal of the Clay for Play manual by 20 professionals in the field of Ceramics, Special Education, Psychiatry/Medicine, Psychology, and Education. Data was analysed using descriptive and percentage methods

In order to achieve the objective of this research, the study was divided into three parts namely Design and

development of the Clay for Play Model and Clay for Play ManualField Work: This involved testing the education/rehabilitation components of the Clay for Play manual Appraisal: assessment of the Clay for Play Manual

Designing the components of 'clay for play model'

The “Clay for Play Model” is a capacity building process in which the principles of play are applied for the rehabilitation and education of children with LD. It focuses on the usefulness of clay as a veritable tool and a non-chemical intervention of learning disabilities for enhancing reading, writing, and Arithmetic, sensory and visual-perceptual skills, exposing children to their environment by enabling them to interact socially through individual and collective play irrespective of their disabilities, age, culture, class, environment and educational level.

The 'Clay for Play model' was tested and proven a reliable intervention aimed at reducing the effect of learning difficulty caused by fine or gross motor skills. The 'clay for Play model is functional and developmentally appropriate with curricular domains that include academic, communication, behaviour, social, cognitive, vocational, self-management, community , recreation/leisure and motor/physical development.

Motor development: Fine motor and gross skills are enhanced through wedging or kneading clay, it involves the use of two hands manipulative process, the real work is done by the weight of the torso and the shoulders. So the surface upon which the work is carried out should be about thigh height, while the rolling or manipulating clay can strengthen the hands, fingers and wrists.

Academic component Reading, Writing and Arithmetic (3Rs)

This is through formation or moulding of alphabets, clay balls useful for learning to count and doing addition and subtraction. Vocational component: Visual and Sensory- perceptual skills can be enhanced through tactile experience; the soft and sensory qualities of clay can aid eye-hand coordination and helps the child's imagination Social component: social Interaction with peers during first stage of play enforces self-management and communication through cooperative play. When functional products are finished e.g. key-rings, jewelry, etc. children will see themselves as capable of engaging in a purposeful activity which is likely to develop self-esteem.

Cultural or indigenous community recreation and leisure through environmental exploration by digging out clay from a location not too far from the school can be a rewarding experience or positive reinforcement from the parents/care givers to the child. A child's interaction with the environment through exploration offers a critical opportunity for a child to know and learn more about his community. Cognitive and behaviour component: Learning difficulty intervention. The child's support team, in consideration of the child's needs develop an Individual Education Plan (IEP). This is aimed at improving cognition, working with clay is a calming activity, and LD can work out their stress or release stress by squeezing clay. Ultimately, play with clay can be therapeutic.



Plate 1: Components of the 'Clay for Play Model' Developed and Designed Esther Dokyoung in 2011

The Design Procedure of the Clay for Play Manual

This study focused specifically on fine motor development; therefore several exercises and ways of playing with clay were developed and designed in accordance to basic ways of clay sourcing, preparation, and clay play. While the second component confused on the cognitive or academic aspects, the clay mathematical game, using designed and fired clay beads made by the researcher for the clay for play manual as an intervention for the Mathematical and reading discrepancies of subjects. Plate 2 Cover page of the Clay4Play

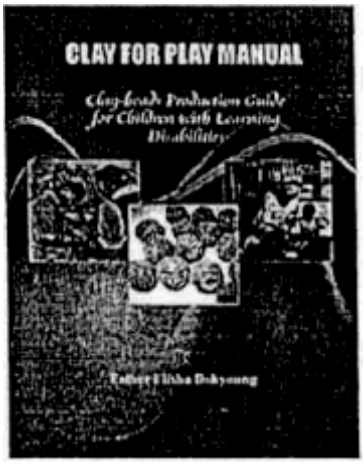


Plate 2: Cover page of the Clay4play

Production of Sample Clay-beads. Sample clay beads were produced for testing the clay mathematical game, Some beads were bon fired in Karshi-Abuja, and then some of the beads were fired to bisque and gloss temperature without any glazes on them in Zaria.



Plate 3a Production of'A' alphabet bead



Plate 3b Fired geometrical beads

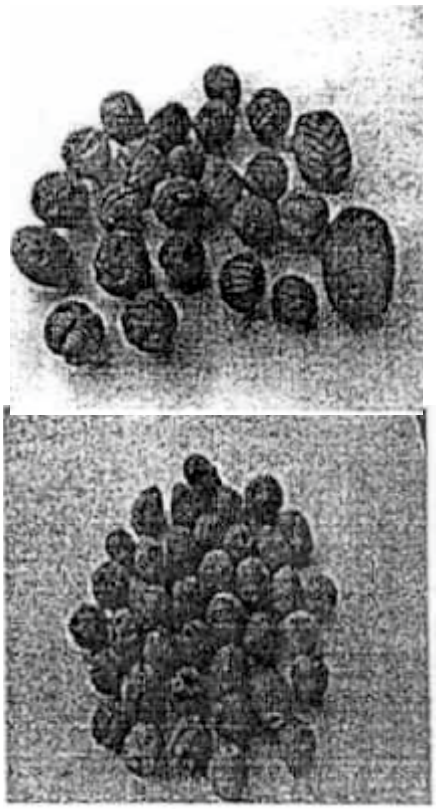


Plate 4: Sample stone ware clay beads with Abuja and Zaria clay respectively
Source: Clay tor Play field work

Clay for Play Video Show

The "Clay for Play" six minutes video was shown to test the interest and or ability of the subjects to recall, verify the relevance of the soft copy of the manual on visual learning and to also test the impact of the video on memory and manual expression.



Plate 5: watching the clay for play video the clay mathematical game

The Clay Mathematical Game was introduced to the subjects although they were distracted and lost concentration, then a simple mathematics class work which was administered to all of them. The study revealed that subjects with Mental Retardation performed better in the Clay Mathematical game, rolling and squeezing clay, while one (1) of the autistic children even produced clay alphabets spontaneously without any prompt. The CP had the biggest challenge. Bead rolling was a herculean task for them, which led to emotional outburst. Ten sample clay-beads were each given to the nine subjects in a transparent container for counting, doing simple addition and subtraction at home. 88.8 % of children were not allowed to play freely at home with the clay-beads due to fear of swallowing, losing them or having them stolen.



Plate 6a: Raphael's mother assisting her to count



Plate 6b: Teacher James voluntarily assisting Joshua



Plate 6c: Happy Joshua after completing his assignment



Plate 6d: Do you Understand?

Demonstration of Clay Bead Making

The various processes of making clay beads were demonstrated with the children for just five minutes to sustain their attention, beginning with rolling, squeezing to moulding clay alphabets . Sample clay beads were produced by most of the subjects. While some of the subjects responded by spontaneous imitation, all subjects attempted without any assistance.



Plate 7: Ruby says '1 got it right' Spontaneous imitation



Plate 7: Ruby says '1 got it right' Spontaneous imitation

Clay play games brought more intimacy and excitement. The children were always wearing smiling face due to the tactile exposure they had this affirms the claims of Argyle in the intimacy model which suggested that 'equilibrium develops from intimacy'. Where there is a joint function of eye -contact, physical proximity, intimacy of topic, smiling, etc. To sustain their attention, a song was introduced. In fact Joshua recalled the Clay for Play song throughout.

All subjects were given small lumps of clay to squeeze hard; all except Longtong could not squeeze the clay. With more time in squeezing clay objects subjects came up with fine sculptures. The samples below were made as flat objects but creatively analysed by the researcher to free standing objects. The first picture on plate 9a looks like a cow, while the second resembles an abstract representation of a man, and the third picture is a collection of all squeezed objects made by the subjects.

Appraisal of the Clay for play Manual

To ensure the appropriateness of the method of instruction, steps required for activity and sequence, clarity of task, and to check the validity of the manual, twenty questions were adopted from the AOTA basic form. In view of the tactile, and problem solving qualities of the clay for play manual, it was assessed by twenty (20) individuals in the field of Ceramics, Special Education,

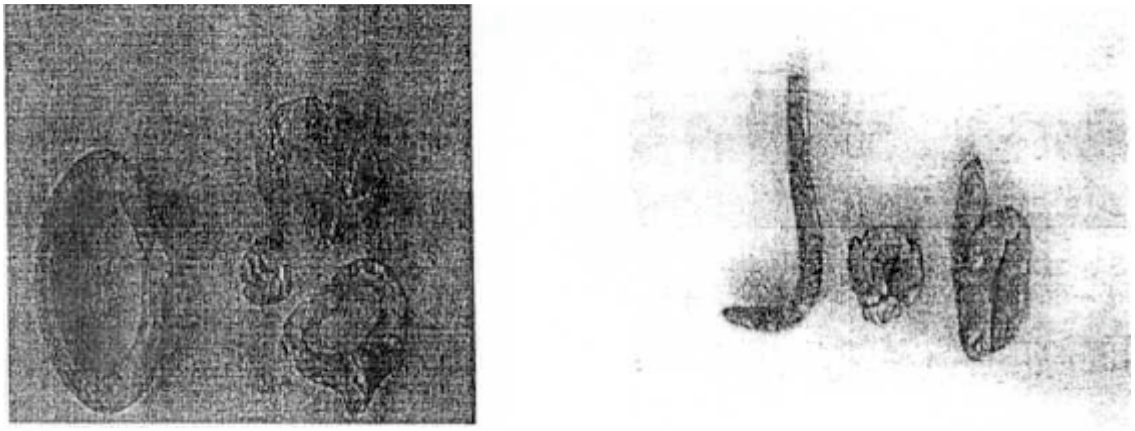


Plate 8 (a) & (b) Fired clay beads made by the subjects Squeezing Clay

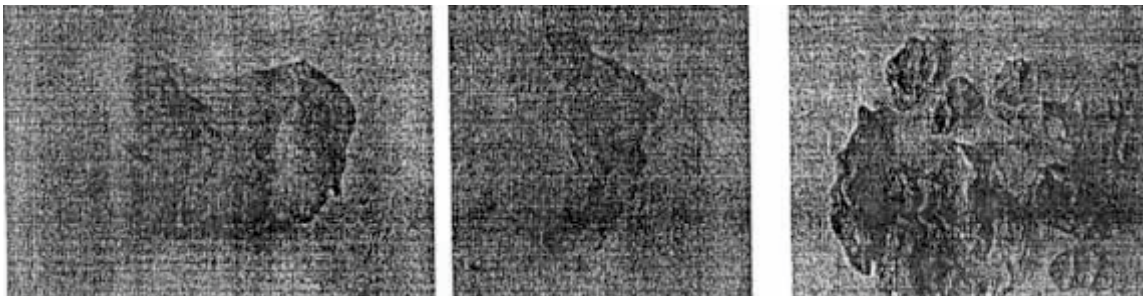


Plate 9 (a) (b) (c): squeezed cow, Figurine

Psychiatry/Medicine, Psychology, and

Education. One (1) organisation and parents also appraised the clay mathematical game. Form 3 - 1 Activity Analysis - Basic Form, was adapted from AOTA, 2002: Drake 1999; Hesch et al; 2005. Occupational therapists for over fifty (50) have used checklists for basic mental function. The AOTA check list was developed to be consistent with International Classification of Functioning, Disability, and Health by the World Health Organisation in 2001.

Findings

The study observation test and appraisal of the "Clay for play" indicates that an indigenous Ceramics manual is specifically developed to improve the learning content of children with Learning Disabilities in Nigeria. A complete copy of the 'Clay for play Manual' already tested and adjudged a very good resource useful for special schools, and inclusive learning environments, Psychiatric Hospitals and communities are now available . The study adhered to play with clay for the purpose of fine motor exercise involving hand rotation, wrist movement, coordination of the thumb and fore finger and hand-eye coordination. The study used play with clay to demystify the challenges LD face with mathematics and reading by developing games for mathematics and alphabets for reading.

Data from the assessment of the manual coupled with oral interviews indicate that the 'Clay for Play manual' will tackle the challenge of artistic impairments, clay sourcing, construction processes which parents, many therapists, regular teachers, special educationist, and caregivers have in Nigeria.

Stakeholder in the field of Special Education, and Psychiatry agreed that this research has opened up a new pathway for ceramists to tackle learning problems, evidenced based services for individuals with LD in Nigeria. Now Nigeria has an indigenous manual which other developed countries have long used to successfully handle therapy.

CONCLUSION

The clay work or clay-beads made by the children in the 'clay for play research' produced a forum for social interaction with friends, family and their teachers. More research of this nature may be a way through which this children can make 'contributions' through making gifts and souvenirs and if assisted by their families, they could even make products of beautification and ornamentation like beaded curtains, jewellery, key-rings to boost their self-esteem.

For children with LD to succeed in school, schools and parent should provide an environment that allows play, and in particular play with clay, to exercise their fine motor skills. This flexibility will allow programs that allow LD to adjust and adapt to their specific learning characteristics, challenges and differences. The ability to read, do simple mathematics and engage in daily life depends largely on psychomotor activities. It is not only essential for the acquisition of knowledge but also a necessary condition for the full development of mentally healthy and happy children. Therefore, improving the learning content of LD through the tactile experience will definitely enhance their total well-being.

Clay for play model if adopted and fully implemented in Nigeria will become the first evidence- based research and service that ceramicists can render in the field of Learning Disabilities, and Child Psychiatry to bring relief to parents. Nayak et al (2004) aver that there is a growing recognition of the pain, stress and at the same time challenges families, as well as their children face. The need to support, respite care, intensive care management services and multi-agency treatment plan is necessary.

Obi et al (2008) are of the opinion that "Handicapping diseases have remained major problems associated with immense suffering and superstition in the African setting and there are no accurate vital statistics of the incidence of mental and physical retardation in children in Nigeria. However, it is presumed to be higher

than the level in the U.S.A. or Europe where the efforts of voluntary organizations supplement government efforts". Therefore Intensive health education is needed for the public and also for the teachers who come in contact with children with disabilities.

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