The Efficacy of Technology in Enhancing the Development and Learning of Children (0 – 5 Years)

Adesina, Olusola Joseph

Abstract—The use of Technological tools in the classroom setting has drawn the interest of researchers all over the world in the recent time. Technology has been identified in the recent time as potentials tools to aid learning especially during early childhood stage. The main objective of this is to assist the upcoming younger generations to acquire necessary skills for cognitive development which later enhances effective teaching learning process. The integration of Technology in early childhood requires a careful selection of devices that will both assist the children and the teachers or care givers. This paper therefore, examines some selected literature evidences and highlighted the efficacy of various technologies tools in enhancing the development and learning of children (0 – 5 years). Conclusion and recommendations were also drawn in this paper.

Keywords—Development, Efficacy, Learning, Technological Device.

I. INTRODUCTION

YOUNGER and younger children are becoming immersed in the consumption of media and the early adoption of technology in their homes [1]. The task of thoughtfully integrating technology in and out of education settings requires careful consideration of what is known about childhood development and learning. A child's cognitive development during early childhood includes building skills such as pre-reading, language, vocabulary and numeracy which begins from the moment a child is born. Developmental scientists have found that the brain acquires a tremendous amount of information about language in the first year of life even before infant can speak [18]. To learn and develop well cognitively, emotionally, and socially, young children needed to be exposed a wide variety of things. These include interacting with one another and adults, moving and exploring, manipulating objects, constructing, reading and creating representations, listening, reading of books, engaging in pretend play, conversing and forming relationship [13]. Meanwhile, integrating technology in early development of a child takes many forms. An example of this is seen in the approach used by Reggio Emilia Schools in Italy. This approach dictates that children acquire and deepen their conceptual understanding by representing ideas and actions using different media, similar to the learning and usage of new languages [8].

Similarly, [2] in another project created by the Elliot Pearson Children's school at Tufts University reported that after students were assigned roles such as camera crew, directors, writers and editors, students were able to make their own moves about the parts of the marathon that they found most interesting. There is a strong connection between the development a child undergoes early in life and the level of success that the child will experience later in life. This connection develops and enhances the cognition of the child at this early stage. When young children are produced with an environment that is facilitating, full of opportunities to explore, listen and use language constantly, stand a better chance of developing early developmental skills. There are various education approaches and programs capitalize on the capacity of digital media to extend children's thinking and learning [13]. Evidence of this is found in children advancement spatial and mathematical understanding when they use digital media to manipulate objects and shapes in space, the findings further revealed that a well conceived digital media enable young children to gain greater awareness and more control over their own thinking and actions.

In addition, self-regulation and other abilities are increased in social studies, the arts and other domains using the experiences of video clips and virtual field trips via technology. Children are expected to have considerable background knowledge to comprehend what they have learnt and read. Children from low income and migrant families need growth in background knowledge because their stock of experiences often doesn't match the content and language they encounter in books and other learning materials. The findings of [1] revealed that through digital media, children from urban areas can easily visit places like a diary farm or orchard and rural places. A study by [19], [3] found that there is a significant profound change in teaching and learning mathematics with the use of calculator. However, [15] found that the use of technology per se does not improve students' learning without appropriate teacher intervention [3]. Identified that computer games have also been identified as potential tools for enhancing mathematics instruction although, new technologies, particularly games-based environment may alter learning trajectories for young learners.

In a classroom observation at a University demonstration preschool/kindergarten in a southeastern US city using 28 children, ages 4 and 5 who spent two years in their classroom

Adesina, Olusola Joseph, Ph.D is Senior Lecturer and Coordinator, Early Childhood Centre, Emmanuel Alayande College of Education, Oyo, Oyo State, Nigeria (e-mail: dradesina4u@yahoo.com, tel: 08033842629).

and the University providing the classroom technologies and technical support. It was discovered that there was an evidence of technology integration to promote and document learning. In this study, the children engaged in a long-term investigation of bones, fossils and dinosaur using magnifying glasses, a digital microscope and a child friendly document. The digital camera can be used to create learning e-portfolios to assess and illustrate children's programs, share with families or pass on to the children's teacher [5].

Similarly, the Document cameras and digital microscopes magnify three –dimensional objects, facilitating more detailed exploration and easier collaborative viewing. Children use the tool to view objects from multiple perspectives, angles and magnification. The children can also make use of internet with appreciate teachers guide to find information. This can be done using the educational search engines. In addition, Interactive white board is a large digital touch screens that allows teachers to use the computer and internet with small and large groups. White board can be displayed on a floor stand or mounted to a wall. Children who use the board can easily view internet sites and open digital photos or dictates and write a story together.

Australian Communications and Media Authority survey of media use found that children aged 0 – 4 spent 154 minutes per day viewing free to air television, 127 minutes on commercial channels and 194 minutes per day watching subscription T.V. [20] reported that the benefit that flow to children from good story telling are many and television learning outcomes need to be considered as part of the 0 – 8 curriculum. Stories give children a share purpose, a roadmap for their lives and teach them about feelings, their tribe, their culture and their place in the world. Good television programs can extend children's understanding of their world.

In addition, programs such as Sesame Street have gone beyond the basic number and the alphabet to incorporate elements Gardner's multiple intelligences. The 0–5 age group is moving from a self-centered view of the world to a more social outlook. Researchers opined that programs such as Blue's Clues clearly used the medium of TV to expand not only the child's understanding of but also his or her interaction with the real world. Cognitive gains such as numbers, letters and vocabulary, social learning skills are enhance through the use of television. Researchers observed that unlike some curriculum and media approaches which rigidly separate what experiences are appropriate for infants compared with toddlers and older children, the evidence is that quality TV programs and games can be designed for three to eight years old and understood by them at different levels. The younger ones take in messages that match their level of cognitive development and older children interpret them at more sophisticated level.

Further still, Technology makes it possible to design programs that are not only appropriate to a particular age group but also to different developmental levels within that age group. Games can be used to assist learning from 3–8 years. Games are played on personal computers, mobile phones, PDAs Graphing Calculators, GPs receivers, MP3 players, digital cameras and watches. This has provided an increased, accessibility thus leading to many young gamers drifting away from television to interactive play. There are games meant to teach multiplication tables, numbers, letters, reading and comprehension [9].

Quality educational games can be developed for researchers around shapes, colors, numbers, counting and reading. Games are particularly useful for children with learning disabilities and enhanced hand and eye coordination. Learning that involves the use of game allows children to acquire the following skills [12].

- Seeking information and bring together data from many places.
- Children make decisions quickly which have clear consequences.
- Children become experts at multi-tasking and parallel processing and learn to collaborate with others over a range of networks.

Similarly, children who used computer have been found to be superior in spoken communication and cooperation, they can play better, use more complex speech patterns, and higher levels of verbal communication. They have also better phonological awareness, tell more sophisticated stories and equally have better writing skills. Computer activity motivates and produces a longer attention span and enhances self-concept and attitudes to learning because it involves mastery from level to level [6].

TABLE I
EDUCATIONAL THEORIES EXPLAINING HOW LEARNING MAY OCCUR VIA ENTERTAINMENT

Arousal Theory	Communication messages that can evoke varying degrees of generalized emotional arousal and that can influence any behavior in which an individual engages while in the state of arousal.
Short-Term Gratification Theory	Deals with affective and motivational components including enthusiasm, perseverance and concentration
Internet Stimulation Theory	Suggests that entertainment can spark a student's interest in and imaginations about a topic and thus promote learning and creativity.

Source: [4].

Educational Technologies have the ability to go beyond audio [14]. Educational Technologies do not present multiple media but also can prompt the learner to contemplate information, perform tasks, refine thinking and demonstrate understanding. This informs that explanations presented in words and pictures as opposed to words or pictures make for increased comprehension. In [10], study found that increasing the modality by which content was presented could increase retention rates. Audio can be used with the spoken word or to support emotion through Music. He further stated that sound effects can punctuate a point. A picture is worth a thousand words and multi-media can provide an almost limitless number of pictures and images.

Moreover, [11], study on Teaching Young Children Power Mobility confirmed that Assistive technology enables infants and young children with disabilities to participate in daily routines and activities, facilitates mobility, communication and other primary life functions. Introduction of several

children (20 and 39 months) to motorized wheelchairs to determine their effectiveness in encouraging mobility during these critical ages [7]. These children were found to have emerged cognitive abilities, considering their chronological ages and significant and varying physical disabilities. [16] In another study teaching young children with Autism to use Augmentative and Alternative Communicative devices (AAC) while receiving a naturalistic instructional strategy from teachers. Results from the study indicated that all children demonstrated an increase in communicative interactions during the VOCA and naturalistic teaching.

In Nigeria, the use of technology in children's development and, learning has developed to an appreciable stage in the recent time [17]. In 20 sampled Early Childhood Care Centers, various technological devices are put in place. For instance, on a visit to State Universal Basic Education Centre with 20 children, the care-givers were seen monitoring and observing the children demonstrating as they watch a video clips on Numbers. In addition, some of these children were also observed arranging the animal puzzles without the guide of the caregivers. However, the need to still improve and encourage teachers on the use of Technologies to enhance the learning of children should be emphasized to facilitate the early cognitive and motor skill development of children.

II. The Efficacy of Technology in Development and Learning

There are a lot of advantages and possibilities in the use of Technology in Early Childhood Learning and development. Some of these advantages are:

- To encourage engagement, active learning, creativity and social interaction.
- To enhance classroom learning and meet learning challenges
- It encourages children to participate individually
- The use of technology foster active thinking and interaction with peers
- Needs of children with disabilities can be met
- The use of technological devises give room for learner centered and play oriented activities
- It encourages cooperative learning among the children
- The use of technology (Television) encourages adoption of values, beliefs and behaviors.
- Technology enhances the need for appropriate and effective environments in terms of shapes, sizes and forms.
- It promotes an enriching and stimulating environment which has an effect on human brain development in children.
- It exposes children to the early acquisition of technological skills.
- Technology takes the children to other parts of the world, allow them to shared purpose and provide a roadmap for their lives.
- It affords children to engage in problem solving activities and active construction of knowledge.

III. Recommendations

The introduction of Technology to early childhood development and learning cannot be over-emphasized because of the recent technological advantages. For a child to learn and develop cognitively, emotionally, physically and socially, children needed to be exposed to varieties of teaching learning process using technological devices, some of these technological devices include: television, video clips, audio, digital camera, computer, internet facilities, interactive whiteboard, digital media, educational Games etc. However, for any Technological tool or device to achieve it purpose, teachers or care givers should be skillful technological and carefully select the technology device that will enhance teacher's ability.

In addition, teachers must ensure that selected technological device is placed at an open space to afford all children's participation.

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