A Study of Technology and Its Influence on Intellectual and Physical Development of Primary School Children in Anambra State, Nigeria

Prof. Ngozi E. Anyikwa
Department of Early Childhood and Primary Education
Nnamdi Azikiwe University, Awka, Nigeria

Okwumuo, Victoria Nkiru
Department of Early Childhood Care and Education
Nwafor Orizu College of Education, Nsugbe, Anambra State
okwumuonkiru@gmail.com
DOI: 10.56201/wjimt.v9.no3.2025.pg72.83

Abstract
It was a study of technology and its influence on intellectual and physical development of primary school children in Anambra State, Nigeria. Descriptive survey design was adopted for the study. The study answered two research questions while two null hypotheses were tested at 0.05 level of significance. The sample size was 1,213 respondents. The population of the study comprised 4,043 respondents in the 327 public primary schools in Anambra State. This is composed of 327 head teachers; 2,115 teachers and 1,601 parents. The sample comprised of 98 head teachers, 635 teachers and 480 parents of school children from 98 public primary schools in the six Education Zones in Anambra State. A researcher developed questionnaire titled 'Technology, Physical and Intellectual Development of Children Questionnaire (TPIC_Q)' was used for data collection. The instrument was validated by three lecturers, one from Measurement and Evaluation Unit of Department of Educational Foundations, and two from Early Childhood and Primary Education Department. Cronbach alpha was applied in determining the internal consistency of the instrument with reliability coefficients of the two clusters being; 0.89 and 0.76, respectively, and overall coefficient of 0.83. The researcher with the help of five research assistants collected data for the study. The Mean was deployed in answering the research questions while analysis of variance (ANOVA) was deployed in testing the null hypotheses. Findings of the study revealed that technology has both positive and negative influence on the intellectual and physical development of public primary school children in the state. It further found that the perception of school heads, teachers and parents did not differ significantly on the extent of influence of technology on the intellectual and physical development of public primary school children in Anambra State. The study concluded that the influence is understood to be both positive and negative. It was recommended among others that school heads, teachers and parents should endeavour to pay more attention to the kind of technological gadgets and experience that primary school children are exposed to, so as to channel the children's attention to technologies that would positively impact them more appreciably.

Keywords: *Intellectual Development, Physical Development, Technology, Primary School Children*

Introduction

In present world, innovations in all aspects of life have taken an enviable dimension with technology playing a huge role. In different human endeavours, technology is playing a dominant role. At individual and personal level, including adults and children, exposure to and usage of technology has become almost unavoidable. Technology has become ubiquitous and evolving part of life, offering opportunities for learning and assisting human beings carry out duties faster and more effectively in a sustainable manner. Supporting this, Wheel (2023) posited that technology improves the human environment by assisting humans in solving problems. Continuing, Wheel stressed that in the present world, aside from adults, children take advantage of high technologies for the purpose of communication, grow up with the use of technological devices and consumption of internet content, as well as build their social networks through You Tube, Facebook, Instagram, TikTok and other technological oriented venues. This might be an indication that children, especially at the primary school level could be impacted upon by their exposure to technology.

Technology is a terminology used to describe the application of science knowledge and competences in addressing challenges confronting human beings. Luenendonk (2023) and Wheel (2023) stressed that technology's focal interest is to improve the human environment by remedying needful situations. This could mean that technology manifests in different forms and types with veracities of methods of application, way of solving problems, and purposes they serve. So, when technology is referred to in this study, it is simply the composite or combination of multiple types of technologies that primary school pupils are exposed to, directly or indirectly. Examples might include, but are not limited to exposure to television, mobile phones, smart classrooms, laptops, iPads, internet, social media handles, video games, smart cars and smart learning materials, which might influence their physical and intellectual development.

Child development could be a combination of physical changes, emotional changes, intellectual prowess, changes in relationship structure and changes in language formation. Development is the sequence of changes in human beings that begin with conception and continue throughout life. It involves the emerging and expanding of the capacities of the individual to provide greater facility in functioning. In development there is change that is both quantitative and qualitative. Similar to this, University of Nothingham staff (2023) outlined that development in a child could be physical, social, language, emotional/affective and intellectual/cognitive. Also, Levin (2023) stated that child development portrays the growth and changes, physically, cognitively, emotionally and socially that an individual experiences from infancy through to adolescence. In terms of child development, the study will pay more attention to the physical, social, emotional and intellectual aspects of development. These aspects are believed to be more critical for behavioural changes of a child at the primary school level and could be mostly affected by exposure to technology. In essence, child development is simply the changes in social, intellectual, physical and emotional aspects of the child as he moves from one stage of life to another.

Physical development of children is about the growth and strengthening of their body structure, including their advancement in motor skills, coordination, muscle strength, and overall health. This aspect is enables children to actively engage in exercises of physical nature. Throwing more light into this, Benjamin (2023) stressed that physical development in children follows a predictable sequence but can vary based on genetic or biological, environmental, social and technological factors. For a child to be helped to effectively navigate this aspect of

development, parents, teachers, school heads, caregivers and other personalities known to be associated with early development of the child must be abreast of the typical milestones attainable at different stages, as well as recognize the challenges accustomed with physical development. Putting appropriate technological devices and visuals in place for the children like games could aid their muscular and reflex development.

Intellectual development of the child, sometimes referred to as cognitive development could mean how children learn to think, reason, solve problems, and understand the world around them. Buttressing this, Platis (2023) pointed out that this aspect of development known to occur through interactions with their environment, experiences, and maturation, allowing children to acquire knowledge, build memory, develop language, and enhance critical thinking skills. It is one aspect of child development that is believed to be shaped by a combination of innate abilities and external influences and proper stimulation, environmental support, and effective educational practices are crucial for fostering cognitive growth. However, Platis (2023) argued that challenges such as environmental deprivation, learning disabilities, and cultural differences are known to obstruct intellectual development, hence targeted interventions are often required to help children reach their full potential in cognitive development.

Primary education is basic education in Nigeria and describes basic educational experience for children below adolescence and undertaken for 6 years. Abdussalam (2019) buttressed that what is regarded as primary education in the Nigerian law is the first six years of schooling after preschool experience, and given as part of the universal basic education curriculum. Abdussalam further outlined some of the objectives of primary education as stated in the Nigerian National Policy on Education thus: to inculcate permanent literacy, numeracy, and the ability to communicate effectively, and to lay a sound basis for scientific, critical and reflective thinking among others. In pursuance of the objectives of primary education in Nigeria, various subject curricula have been designed, one of which is coding that is meant to expose pupils to programming. This is a signal that technology is almost indispensable and unavoidable for pupils at the primary school level, as it is thought to play significant roles in children's development. The nature of the impact which technology is believed to be playing in every pupil's development could better be understood if the perception of the head teachers, parents and teachers are sought for.

A head teacher also referred to as the headmaster or headmistress is the equivalence of secondary school principal for the primary school level of education. He or she is considered as the Chief Executive Officer, Chief Administrator and Manager of the affairs of the primary school under his or her care. To be a head teacher in a school is to be in charge of monitoring and supervising curriculum implementation at the primary school he or she is assigned to manage. In the course of discharging relevant duties for the school, he or she relates with pupils, observing and examining different aspects of their growth and development. Even at home, head teachers who are understood to be mostly married also observe and monitor their primary school children, in terms of their exposure and usage of available technologies and could possibly understand how such might be influencing the children, developmentally.

Teachers on the other hand, are the ones who are directly tasked with training and nurturing the pupils in line with provisions of the curriculum. The teachers who are ideally learning facilitators are believed to be close observers of children's development at the primary school level and could make input regarding what aspect of their development that could have been interfered with, by their exposure to technology. This is why the perception of head

teachers and teachers are important medium through which the foreseeable impact of technology on the primary school pupils could be better understood.

There is no denying the fact that technology is important in addressing most challenges that human beings, including primary school children might be confronted with. However, there have been series of observations by different technology related scholars which argued that technology is not all-round healthy and good for the human race, and more especially children. Supporting this, Asiegbu, Akudo and Igbokwe (2023) observed that children are growing up using multifunctional technological devices with potential of information overload, misleading information, adult content, interference with security and privacy, and forming a questionable habit, especially in Awka South Local Government Area of Anambra State.

Similarly, Charles Nechtem Associates (2021) argued that even though modern technologies create new and unimaginable possibilities, it opens new dangers and psychophysical development consequences on children. In addition, with the increased use of technology, children might not be adequately developing their social skills which could lead to more children being socially awkward, withdrawn, shy, or intimidated by social situations. In support of this, Luenendonk (2023) observed that children seem to become reliant on a device to solve problems for them rather than using brain connections to work through a problem and this deforms patterns of formation of brain structures. This could lead to reduced sleep quality, affecting their overall wellbeing and immune system. Burley (2019) observed that children might get used to being alone and lose the desire to engage with their parents, siblings or even friends, outside of the internet.

All these seem to have led to certain physical and psychological problems in the society, such as obesity, physical deformities, loss of muscle mass, hypertension, weakening of density and elasticity of joints and ligaments, weakening of respiratory and cardiovascular capacity, vegetative and psychological disorders. From the foregoing, it is obvious that there exists a very few, if not absence of studies carried out on the influence of technology on primary school pupils' development in the entire Anambra State. This is evidential because majority of scholarly evidences were not in the State, and particularly in primary schools. In attempt to cover this gap, the study was on the influence of technology on the physical and intellectual development of primary school children in Anambra State, Nigeria.

1.2. Statement of the Problem

Technology, if effective and put to the right use, is undoubtedly helpful in addressing challenges that human beings face in their endeavours. With this, primary school children could become positively influenced by the various technologies they are unavoidably exposed to. Unfortunately, this does not seem to be the case among primary school pupils. Children are growing up using multifunctional technological devices and this seem to result in information overload to them with misleading information, adult content, interference with their security and privacy. Even with the increased exposure to technology, children appear to be socially awkward, seeming withdrawn, shy and intimidated by social situations. It is also lamentable that children seem to have become over-reliant on technological devices, such as smart phone, iPad, laptops, social media, among others to solve academic tasks for them rather than using their brains.

A lot of children seem to be getting used to being alone, losing the desire to engage with their parents, friends, siblings and schoolmates outside of the internet. All these seem to have led to certain physical and psychological problems in the society, such as lying, being disrespectful,

loss of muscle mass, hypertension, weakening of density and elasticity of joints and ligaments, weakening of respiratory and cardiovascular capacity, vegetative and psychological disorders in children. Yet, in all these, it seems that little or no comprehensive investigation has been done to examine the situation, and this has become a major challenge. Therefore, the problem of the study is to carry out investigation on the influence of technology on the physical and intellectual development of primary school children in Anambra State, Nigeria.

Research Questions

This study was guided by the following research questions:

1. What is the extent of influence of technology on the physical development of primary school children in Anambra State?
2. What is the extent of influence of technology on the intellectual development of primary school children in Anambra State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the physical development of their children.
2. There is no significant difference in the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the intellectual development of their children.

Method

Descriptive survey design was adopted for the study. The study answered two research questions while two null hypotheses were tested at 0.05 level of significance. The sample size was 1,213 respondents. The population of the study comprised 4,043 respondents in the 327 public primary schools in Anambra State. This is composed of 327 head teachers; 2,115 teachers and 1,601 parents. The sample comprised of 98 head teachers, 635 teachers and 480 parents of school children from 98 public primary schools in the six Education Zones in Anambra State. A researcher developed questionnaire titled 'Technology, Physical and Intellectual Development of Children Questionnaire (TPIC_Q)' was used for data collection. The instrument was validated by three lecturers, one from Measurement and Evaluation Unit of Department of Educational Foundations, and two from Early Childhood and Primary Education Department. Cronbach alpha was applied in determining the internal consistency of the instrument with reliability coefficients of the two clusters being; 0.89 and 0.76, respectively, and overall coefficient of 0.83. The researcher with the help of five research assistants collected data for the study. The Mean was deployed in answering the research questions while analysis of variance (ANOVA) was deployed in testing the null hypotheses at 0.05 level of significance.

Decision Rules

For the null hypotheses, Analysis of Variance (ANOVA) used to test each of the hypotheses at 0.05 level of significance. Each null hypothesis was rejected if p-value was less than the 0.05 but was not be rejected if p-value was greater than or equal to 0.05. For the items of research questions, the Mean ratings were used. For the remarks on each item, the following range of values were used:

1.0 – 1.49 = VLE
1.50 – 2.49 = LE
2.50 – 3.49 = HE
3.50 – 4.00 = VHE

Results

Research Question 1: To what extent does technology influence the physical development of primary school children in Anambra State?

Table 1:

Mean ratings of school heads (Sch. H), teachers and parents of public primary school children in Anambra State on the influence of technology on the physical development of their children.

S/N	Items	Sch. H X (N=98)	Remark	Teachers' X (N=635)	Remark	Parents' X (N=480)	Remark
1.	equips children with abilities for navigating a mobile phone screen	2.76	HE	2.91	HE	2.78	HE
2.	improves children's engagement in physical exercise as they tend to emulate those they watch via technological gadgets	2.74	HE	2.70	HE	2.77	HE
3.	enhances their singing abilities as they tend to emulate those, they watch on technological gadgets	2.76	HE	2.69	HE	2.77	HE
4.	develops motor skills in children through navigating PC keyboard seamlessly	2.79	HE	2.77	HE	2.82	HE
5.	empowers children in handling remote control at home	2.70	HE	2.77	HE	2.66	HE
6.	enhances children ability to operate basic calculation	2.86	HE	2.88	HE	2.81	HE
7.	engage in fine motor skills (drawing, building blocks, puzzles)	2.79	HE	2.75	HE	2.78	HE
	Cluster Mean	**2.77**		**2.78**		**2.77**	

The analysis of data on table 1 reveals that the respondents agreed that to a high extent technology positively and negatively influences the physical development of public primary

schools' children, since the items all had a mean score of 2.50 and above. The cluster mean scores of 2.77, 2.78 and 2.77 for school heads, teachers and parents, respectively, also affirmed that technology to a high extent influenced the physical development of public primary school children.

Research Questions 2: What is the extent of influence of technology on the intellectual development of primary school children in Anambra State?

Table 2:
Mean ratings of school heads (Sch. H), teachers and parents of public primary schools' children in Anambra State on the influence of technology on the intellectual development of their children.

S/N	Items	Sch. H X (N=98)	Remark	Teachers' X (N=635)	Remark	Parents' X (N=480)	Remark
1.	enhances children's ability to remember instructions given for tasks	2.72	HE	2.53	HE	2.70	HE
2.	motivates children to concentrate on given tasks	2.80	HE	2.83	HE	2.67	HE
3.	empowers children to try different approaches in solving their problems	2.70	HE	2.80	HE	2.72	HE
4.	enhances children's ability to express their thoughts and ideas more fluently	2.65	HE	2.71	HE	2.50	HE
5.	improves children's ability to solve mathematical problems	2.69	HE	2.57	HE	2.92	HE
6.	Improves children's creative activities	2.61	HE	2.60	HE	2.63	HE
7.	makes children to be curious	2.68	HE	2.70	HE	2.67	HE
	Cluster Mean	**2.69**		**2.68**		**2.69**	

On table 2 it is found that the cluster mean of ratings are 2.69, 2.68 and 2.69 for school heads, teachers and parents, respectively. This implies that technology to a high extent influenced the intellectual development of primary school children. Analysis from table 3 also revealed that the various respondents agreed that technology positively and negatively influences the intellectual development of primary school children, since the items all had a mean score of 2.50 and above.

Hypothesis 1: There is no significant difference in the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the physical development of their children.

Table 3:

Summary of Analysis of Variance (ANOVA) Statistics on the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the physical development of their children.

Status	Sum of Squares	Df	Mean Square	F-ratio	F-critical	Prob.
Between Groups	.32	2	0.32	0.81	3.15	.07
Within Groups	2,222.01	1,211	1.65			
Total	2,229.57	1,213				

Table 3 revealed that the f-ratio value is 0.81 at 2 df 1,211 and at 0.05 alpha level of significance. Thus, the critical value (3.15) is found to be greater than f-ratio value (0.81), and the probability level of significance P(0.07) is greater than 0.05. This entails that there is no significant difference in the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the physical development of their children. Therefore, the null hypothesis is not retained.

Hypothesis 2: There is no significant difference in the mean ratings of school heads, teachers and parents of public primary school children in Anambra State on the influence of technology on the intellectual development of their children.

Table 4:

Summary of Analysis of Variance (ANOVA) Statistics on the mean ratings of school heads, teachers and parents of public primary school children in Anambra State on the influence of technology on the intellectual development of their children.

Status	Sum of Squares	Df	Mean Square	F-ratio	F-critical	Prob.
Between Groups	1.73	2	1.73	1.29	3.15	.080
Within Groups	2,180.16	1,211	1.49			
Total	2,201.77	1,213				

Table 4 showed the f-ratio value of (1.29) at 2 df 1,211 and at 0.05 alpha level of significance. The critical value (3.15) is greater than f-ratio value (1.29), the probability level of significance P(0.080) is greater than 0.05. This implies there is no significant difference in the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the intellectual development of their children. Therefore, the null hypothesis is not rejected.

Discussion of Findings

Table 1 reported the cluster mean of ratings on the influence of technology on the physical development of primary school children are 2.77, 2.78 and 2.77 for school heads, teachers and parents, respectively. This means that all the items of the instrument are consented to by the respondents. This indicates that technology influences the physical development of primary school children to a high extent. For instance, it improves children's engagement in physical exercise as they tend to emulate those they watch via technological gadgets, among others. Corroborating the findings of the study, Zahra and Alanazi (2019) who examined the impact of using digital technology on children physical, social and emotional wellbeing in Malaysia reported that using technology had an impact on both physical and psychological health of children, and there was an improvement in mothers' awareness of this too. By implication, even though the study was conducted far away in Malaysia, it reflects the key role technology in improving awareness for children to be committed to their physical exercise in order to enhance their physical development. The current study also, table 3 revealed that there is no significant difference in the mean ratings of school heads, teachers and parents of public primary school children in Anambra State on the influence of technology on the physical development of their children. This indicates that the various categories of respondents are similarly in agreement that technology influences children's physical development to a high extent.

Table 2 also reported that the cluster mean of ratings are 2.69, 2.68 and 2.69 for school heads, teachers and parents, respectively. This indicates that the individual items on the influence of technology on the intellectual development of primary school children are considered acceptable, hence a high extent influence. For instance, table 3 revealed that technology among others influences enhances children's ability to remember instructions given for tasks; empowers children to try different approaches in solving their problems; enhances children's ability to express their thoughts and ideas more fluently, and improves children's ability to solve mathematical problems. In a similar investigation to the finding of the current study, Andor, et al. (2018) reported that video-aided instruction, which is an aspect of technology used to teach children was significantly effective in improving primary school pupils' interest and memory development in arithmetic, there was no significant gender difference in primary school pupils' interest and memory development in arithmetic. They further reported that there was no significant interaction effect of instructional approaches and gender on primary school pupils' interest and memory development in arithmetic. In same vein, table 8 also reported that there is no significant difference in the mean ratings of school heads, teachers and parents of public primary schools' children in Anambra State on the influence of technology on the intellectual development of their children. Put differently, the perception of school heads, teachers and parents of public primary children in Anambra State did not differ statistically on the influence of technology on the intellectual development of pupils.

Conclusion

Based on the findings, it was concluded that technology has positive and negative influence on both the physical and intellectual development of primary children. For the findings, the perceptions of school heads, teachers and parents did not differ statistically on the influence of technology on the physical and intellectual development of public primary school children. It is understandable that technology can influence the physical and intellectual

development of primary school children in either positive or negative ways, depending on how children's exposure to technology is moderated and controlled. If a primary school pupil is well guided and monitored when using technological gadgets, he or she stands to gain commendable and positive touch of technology. On other hand, if the child is allowed to use technology without proper guidance, he or she will become vulnerable, leading to negative influence of technology being experienced by the child. Therefore, technology can influence a child's physical and intellectual development in both positive and negative way, hence the need for vigilance and effective guidance of children's exposure to the use of technology.

Recommendations

Based on the findings and conclusion, the following recommendations were made:

1. School community and parents should look out for more videos and other technological gadgets showing people athletes engaging in physical exercise and aerobics. Pupils could learn a lot from such by re-watching and mimicking such athletes to the point of aspiring to become like them in the future. This will help them to start early to practice what their cherished athletes do, thereby improving their physical wellbeing.
2. School community and parents should collaborate to acquire and install more technologies that are known to enhance children's intellectual capacities. By doing this, children's intellect will become better developed for creative and calculable tasks that could propel them to become inventors and creators of appreciable enterprises in the future.

References

Abdussalam, A. (2019, 2nd May). *Sources of basic education funding in Nigeria.* Retrieved from https://educeleb.com/sources-basic-education-funding-nigeria/, on 8/03/2023

Andor, S. E., Aneshie-Otakpa, V. O., Akobi, T. O., Agah, J. J., Okeke, A. M., Ube, M. O. and Iroanusi, C. (2018). Effect of video-aided instruction on primary school pupils' interest and memory development in arithmetic in Ogoja Local Government Area, Cross River State.*The Educational Psychologist, 14*(1), 238-256.

Asiegbu, E. C., Akudo, F. U., Igbokwe, I. C. and Emmasiegbu, C. M. (2023).*Negative influence of information and communication technology (ICT) on children's learning outcome in public primary schools in Awka-South Local Government Area of Anambra state, Nigeria.* Retrieved from https://www.researchgate.net/publication/ 354076791

Benjamin, R. E. (2023). Maternal and child undernutrition and overweight in low-income and middle-income countries. *The Journal of Child Development, 2*(8), 47-56.

Berkeley, H. R. (n.d). *How social learning theory works.* Retrieved January 8, 2024, from https://hr.berkeley.edu/how-social-learning-theory-works

Burley, J. (2019).*Television shows and e-games: Are children's behaviour and brain development influenced by their digital technology use?* Retrieved from https://www.digitalchild.org.au/blog/television-shows-and-e-games-are-childrens-behaviou r-and-brain-development-influenced-by-their-digital-technology-use/

Charles Nechtem Associates (2021).*The impact of technology on children*.A Charles Nechtem Company.

Hatzigianni, M., Tanya, S., Harrison, L. J., Waniganayake, M., Li, P., Barblett, L., Hadley, F., Andrews, R.., Davis, B. and Irvine, S. (2023). The role of digital technologies in supporting quality improvement in Australian early childhood education and care settings. *International Journal of Child Care and Education Policy, 17*(5), 1-7. Retrieved from https://doi.org/10.1186/s40723-023-00107-6

Heintz, D. (2022). *The study of technology and its positive and negative effects on the physical and mental development of children.* Iowa State University

Levin, E. (2023). *Child development: Definition.* Retrieved from https://link.springer.com/referenceworkentry/10.1007/978-0-387-79061-9_523

Luenendonk, M. (2023).*What is technology? Definition, types, examples.* Retrieved from https://www.founderjar.com/what-is-technology/

NOLDUS, T. (2023).*What is behaviour?* Retrieved from https://www.noldus.com/blog/what-is-behaviour

Obermeier, M. (2018).*Understanding the "why" of children's behaviour.* Retrieved from https://medium.com/@monikaobermeier/understanding-the-why-of-childrens-behaviour-df471c370f38)

Platis, J. (2023). *What is child development?*https://childdevelopment.com. au/areas-of-concern/what-is-child-development/

University of Nothingham (2023). *Introduction to childhood development.* Retrieved from https://www.nottingham.ac.uk/helmopen/rlos/child/foundation/page_twel ve.html

Wheel, B. (2023).*Technology in early childhood education*. Retrieved from https://mybrightwheel.com/blog/technology-in-early-childhood-education

Zahra, N. A. I. and Alanazi, A. A. (2019). Digital childhood: The impact of using digital technology on children's health. *International Journal of Pharmaceutical Research & Allied Sciences, 8*(3), 144-154