THE DIGITAL CHARATERISTICS AND TECHNOLOGY USE OF PUPILS IN NIGERIA

A THESIS SUBMITTED TO THE GRADUATE
SCHOOL OF APPLIED SCIENCES
OF
NEAR EAST UNIVERSITY

By
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In Partial Fulfilment of the Requirements for
the Degree of Master of Science
in
Computer Information Systems

NICOSIA, 2016

Eluwa Magnus EZEUDO: THE DIGITAL CHARATERISTICS AND TECHNOLOGY USE OF PUPILS IN NIGERIA

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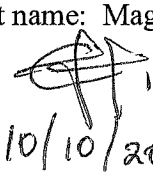
Signature: 

Date: 10/10/2016

ACKNOWLEDGEMENT

Firstly, I would like to express my sincere gratitude to my principal supervisor Assoc.Prof.Dr. Nadire Cavus for the continuous support, patience, motivation and immense knowledge during my master study related research. Her guidance helped me in all the time of research and writing of this thesis. I could not have imagined having a better supervisor and mentor for my Master study.

Besides my supervisor, I would like to thank, Prof.Dr. Dogan Ibrahim, Assist.Prof.Dr. Seren Basaran, and the rest of my jury committee for their insightful comments and encouragement, also for the vital questions to widen my research from various perspectives.

A special thanks to my parents, Mr and Mrs R.C. Eluwa words cannot express how grateful I am for all the sacrifices that you made on my behalf. Not forgetting my wife Mrs Jasmin Eluwa-Sandor and her parents for their immense love and support. Your prayers and courage was what sustained me thus far.

Lastly, I would also wish to thank all of my friends who supported me in writing, and inspired me to strive towards my goal.

To my parents....

ABSTRACT

Current generation of children has been described to exhibit specific characteristics which different from the generation before them due to the use of modern technologies. Recent studies have mainly focused on the characteristics at the higher education setting in the developed countries. Very little research has been done to determine if the characteristics also exists in developing countries at primary school level. The study determined the digital characteristics and use of technology of primary school pupils in South East of Nigeria. The study used multistage sample method to identify the 510 participants which represented from 9-12 years, among government and private schools from urban and rural areas. The instrument used was for research survey was paper based questionnaire. Descriptive analysis, independent sample *t*-test and ANOVA were all used to analyse the data. Findings identify significant differences in characteristics evident between pupil's locations, type of school and use of technology. The main finding shows that the digital characteristics and use of technology of children is on the average and not highly evident. Finally, the study shows that digital divided still existing regarding technical education and call for educators, government, and private sectors to review or redesign the teaching and learning system to accommodate the characteristics of Digital Child.

Keywords: Digital natives; characteristics; digital child; learning styles; use of technology

ÖZET

Şimdiki çocuklar, moderin teknolojiyi kullandıkları için önceki dönemlerdeki çocuklardan daha değişik teknolojik özellikler göstermektedirler. Son çalışmalarda araştırmacılar gelişmiş ülkelerdeki yüksek öğretim üzerine odaklanmıştırlar. Nijerya'da ilköğretimdeki çocuklarda bu teknolojik karakteristiklerin olup olmadığını tesbit etmek için geçmişte çok az çalışma yapılmıştır. Bu nedenle, çalışma Güney Doğu Nijerya'da ilkokul öğrencilerinin teknolojik özelliklerini ve teknoloji kullanımlarını belirlemek için yapılmıştır. Çalışmada 9-12 yaşları arasında devlet okullarından ve özel okullarından, şehirlerden ve şehirden uzak yerlerden 510 katılımcı alınmıştır. Kağıt üzerinde anket yoluyla bilgi toplanmıştır. Bağımsız grup t-testi ve ANOVA testleri yapılarak alınan veriler analiz edilmiştir. Bulgular, öğrencilerin yaşadıkları yerler, gittikleri okullar ve teknolojiyi kullanımları hakkında önemli farklılıklar göstermiştir. Çalışmanın en önemli bulgusu ise, çocukların teknolojik özellikleri ve teknolojiyi kullanımları ortalama olup yüksek derecede belirgin olmadığıdır. Çalışmanın sonuçlarından, teknik eğitim konusunda teknolojik farklılığın hala daha bulunduğu tesbit edildiğinden eğitimcilerin, devletin ve özel sektörün çocukların Teknolojik Çocuk olması için eğitim ve öğrenme konusunu gözden geçirmeleri gerektiği düşünülmektedir.

Anaktar kelimeler: Teknoloji yerlileri; karakteristikler; teknolojik çocuk; öğrenme stilleri; teknoloji kullanımı

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LIST OF ABBERVATIONS

AUN:	American University of Nigeria
ICT:	Information Communication Technology
IPI:	International Press Institute
LS:	Learning Styles
M:	Mean
MVK:	Multimedia Visual and Kinematics
OXIS:	Oxford Internet Survey
PS:	Playing Styles
SD:	Standard Deviation
SPSS:	Statistical Package for Social Sciences
TV:	Television
UN:	United Nation
UOT:	Use of Technology
USA:	United States of America

CHAPTER 1

INTRODUCTION

In this chapter the problem statements, aim of the study, significance of the study, limitations and overview of other chapters of the study are described.

1.1 Technology a Fundamental Change in Child Development

Information technology has grown so rapidly that it has become integral part of children through computational device. This current rapid development of the new information technology in the society have impact a great influence in the children way of life or character regarding their environments. A major propensity today is development and advancement of modern information society, which children are also highly exposed to this tendency of development. Research shows or indicates high usage of ICTs by today's children (Valentine, Marsh & Pattie, 2005).

The use of modern Technology such as mobile phones, tablet, iPad and personal computer has always had a strong influence on the teaching and learning, as it has influence all other aspects of our lives and the world general. This present generation of young children are the first to experience a world of technology, However called "Digital Natives" (Prensky, 2001), "Net Generation" (Oblinger & Oblinger, 2005), "Screenagers" (Ruskoff, 1997) and "Digital Child" (Layton, 2000) and so on.

Research on "Digital Natives" has shown that today's children interact with one another and the world in a different way than any generation before them. They also possess different learning and teaching style due to the digital environment that have influenced on them (Prensky, 2001a; 2001b). This show that today's children and those of the future will grow up in a dynamic multimedia environment as information technology advanced day-by-day.

Expecting that the brains of digital generation are physically recognized due to disclosure to digital technology and its surroundings amid improvement they procure information, investigative capacities and qualities by digital technology mainly out of school hours. Deteriorating to psychological procedures, from the view of neurosciences, instructing and

learning are critical elements of psychological and neurological improvement of youngsters (Pam, 2010). These methods for advancement includes regular collaboration between the child and environment from individual cells to skin as evident edge of individual (Solesa and Grijak 2006).

Brains neuroplasticity is another model; however a large number of tutors today consider that human cerebrum doesn't physically change under environmental impacts, generally researchers contradict that after the age of three years, it is affirmed that new boost and new experience always shows signs of change a mind structure and influence a method for people groups considering. This change thus relies on upon steady incitement and escalated inputs (Solesa and Grijak 2006). Neuroplasticity is said to be that brain truly rebuilds neural pathways all through our lives, thus making new cells, producing new associations; it sets up new neural hardware and therefore, constantly makes new thinking patterns (Solesa and Grijak 2006). For instance; youngsters who grew up with PCs created hypertext minds as they have parallel subjective structures that don't procedure successively.

Therefore brain develops and we can conclude that brain maintains neuroplasticity during life time. Today we know that the brain develop differently by subject to exposure towards different external stimulus, thus we can henceforth observe the physical characteristics of Digital Child.

Finally, it can be stated that information technology and its environment have great effect on children characteristics and also technological advancement and diversity changes their characteristics regarding environment and time (Bennett, 2012). The characteristic of digital child depends on its environment and technological diversity. Based on the rapid technology advancement it is vital to investigate the use and effect of the modern technology among the pupils in the southeast of Nigeria regarding teaching and learning.

1.2 Problem Statement

Digital Native or Net Gen has been a crucial issue which must be addressed by most responsible individual (teachers) and institutions (educational institutions) that are accountable to change in response of the demands of the new generation (Jones et al., 2010).

Since it is a crucial issue, many researches have been conducted about Digital Native at other countries like United Kingdom, USA and European countries (Jones & Shao 2011). It is important to investigate how children learn and what their expectations towards digital learning environment. There has been little or no research done to investigate or identify on the characteristics of Digital Child in Nigeria. Nigeria is facing one of the world's worst learning crises and desperately needs to rethink about the education system. American University of Nigeria (AUN) estimations, that at least 300,000 teachers working in the country do not have adequate training (The Economist, 2014). Addition to that, the UN report (2014) stated that Nigeria needs almost 400,000 new teachers in 2015, in order to achieve universal primary education. The requirements are gigantic. Educationist said that the old traditional education method will not work (Vanguard, 2014). But technologist claim that computers, tablets and phones can help. Developing connectivity makes it easier to reach students through technology than traditional teaching methods. In classrooms where books are rare, teachers can use free online resources to keep their lessons up to date. Apps make classes more interactive, evicting unproductive rotation learning. It is equally difficult to see an ineffectual government distributing technology to schools through the country. But the private sectors are bringing a new approach to education; and a minority of children have the hope of a better future. Nevertheless many researches have been conducted on Digital Natives in other countries (Jones & Shao 2011), but the findings cannot be used to implement for children in Nigeria due to aspects of differences such as socioeconomic, culture and education system.

1.3 Objective of the Study

To investigate digital characteristics of primary school children in Nigeria with regard towards educational reform.

1.4 Research Questions

In order to accomplish the purpose of the study, the answers to the following questions were sought after:

1. How is the use of technology among children?
2. What is the opinion of children on Digital Characteristics?
3. Is there any statistical relationship between Use of Technology and
   - 3.1 Learning styles?
   - 3.2 Multimedia Visual and Kinaesthetic?
   - 3.3 Multitasking?
   - 3.4 Playing style?
4. Do age, gender, school and location affect the characteristics?
   - 4.1 What is the difference on digital characteristics of children with respect to age?
   - 4.2 What is the difference on digital characteristics of children with respect to gender?
   - 4.3 What is the difference on digital characteristics of children with respect to type of school?
   - 4.4 What is the difference on digital characteristics of children with respect to location?

1.5 Significance of the Study

The study shows a significant diversity in digital characteristics based on skills, knowledge and interests of young people or children and suggests that digital native concept ignored digital divided that exist. The study Identify the main characteristics of digital child with regard to its technological diversity and development. The trends in the children's digital market are part of a much larger set of development in the digital revolution currently undergoing hereby enhance economic technological growth and avenue for related research. However, this study will assist more researcher and software developers in the department of computer information systems to always consider the digital native's characteristics while designing software's or undertaking a related research.

1.6 Limitations of the study

This study has the following limitations:

1. This study is limited by the date that it started, January 2015 to December 2015.
2. This study is limited to South East of Nigeria.
3. This study is conducted on children between the ages of 9 to12 years old among private and public school.
4. This study refers people born from 1980 as digital Natives.

1.7 Overview of the study

This thesis comprises of six chapters, references appendix:

Chapter Two contains some related research about the characteristics of "Digital Natives" or "Net Generation".

Chapter Three comprises the general collection of the interrelated concepts about Digital Child and technologies.

Chapter Four encloses the research methods or model, participants, data collection and data analysis tools in which the study is being carried out.

Chapter Five illustrates the results obtained and are discussed in view of the fundamental aims of the research.

Chapter Six includes the recommendation and conclusion of the study and here by suggests ways towards more research through its finds or results.

CHAPTER 2

RELATED RESEARCH

This chapter present some research on the characteristics of the Digital Native or Net Generation and the factors that influence the character of generation such as year of born, technology, experience and environment.

2.1 Important Digital Native Characteristics

Tapscott (2009) observed the Net Generation behaviours in terms of interacting, thinking socialising and working of those that are born during 1976-1998 and who have grown up with the internet. Interview was conducted with 11,000 young people worldwide. In his findings he highlights the important net generation's characteristics regarding their digital environment.

Ellen and Rebecca (2009) assessed critique and show new evidence against the Digital Native concepts as based purely on generational differences; it as well propose a figure of digital activities that indicates digital native-ness and then examine which category of people are mostly exhibit these characteristics. This research was based on the 2007 oxford internet survey (OXIS). The survey is multistage probability sample survey of 2350 respondents, of which 1578 were internet users from 14 years and older. Its further findings showed that experience, breadth of use, self-efficiency and education are also vital than age in explaining how people become digital natives. The findings basically shows to support the arguments put forward by Pernsky and other researchers. A huge number of people that use the internet are likely to come from media rich homes are more confident about their skills and are more likely engaged in online learning activities.

Koutropolous (2011) investigated recent research findings that have been carried out regarding the Digital Native's concepts and their true nature. In conclusion, it went further in turning a careful gaze onto the assumption, foreseen as common sense knowledge of what the characteristics of Digital Natives are.

Ackermann (2011) described six area of change that showed how today children generation play and learn hereby see themselves dwell in place, relate to others and react thing around their environment. Based on its literature reviewed, the findings showed that all together these areas provides a model to rethink on old assumptions regarding on what it means to be knowledgeable creative and literate, however provides modern venues for educators and designers to understand the native strengths, as well providing support for what they might be missing.

Susa (2014) explored the attitude of the Digital Native's students on the course of Business Informatics at higher education institutions, and also compared with attitudes of digital immigrants. The study was conducted using the sample of 492 first year Business Informatics students from Zagreb; Croatia. Data was collected using 7 Likert-scale Questionnaire. Result was compared with a research conducted in 1998. In comparison, Digital Natives distinguish their level of competency in the subject of Business Informatics before teaching practices, much higher compared to digital immigrant. Therefore Digital Native student level of competency in the subject is high before and after teaching practices.

Aziz and Ramli (2014) focused to determine if the Malaysian secondary school student possess or exhibit the characteristics of Net Generation. The multi-stage cluster sample used to identify the participants of the research comprises two different forms for urban and rural area. The survey from 384 secondary school students showed that Malaysian student possess the characteristics of Net generation and also revealed that there are differences in type of school and locations. Finally the research calls for the need to design the teaching and learning system at secondary schools to accommodate the different characteristics of Net Generation.

Common digital characteristic of the children are multitasking, prefer learning through multimedia, prefer to play with digital or interactive toys, difference in interest towards use of technology.

2.2 Diversity and Variation on the Use of Technology among Young People

Selwyn (2009) developed and provide a review of the recent published writings on youth and digital technologies hereby support a true understanding of young people and digital technology in aspect of educational studied, information science and media/communication. The results showed that use of digital technologies among young people varies and always understated. This study highlighted a missing notion of technological and biological philosophical position that state the present reveal of children, youth and digital technology. It also challenged the popular assumption about the Digital native's concept of been more talented in uses of digital technologies.

Corrin et al. (2010) examined first year student technology access and usage in two different contexts of use; academic study and everyday life. A paper-based survey was administered to first year students across seven faculties of Australian University during second semester of 2008 academic year. A number of 470 respondents met the criteria for this study. The finding indicated that wide diversity of usage of technologies, with the usage rates of technology in everyday life being generally higher than those in academic study. The result also showed that inductions are not useful in informing the design of teaching and learning in higher education.

Van den Beemt et al. (2010) analysed that the rigorous use of interactive media has led to study about the effects of these media on youth. This study investigated in-depth diversity in interactive media use among young youth. The answer to the study question was by a survey among 2138 Dutch students' aged 9 to 23 in education levels ranging from primary to higher professional education. Results showed that contemporary youth can be divided into groups based on the use of interactive media and call for a better understanding of theses clusters and the characteristics of their member. The suggested implication is that cautious should be applied while using these media as educational or learning tools, because contemporary students showed diversity on kind of interactive media they prefer to use.

Jones et al. (2010) investigated the Net Generation student on how they encounter e-learning at five universities in England. The study explore age related difference among first year student and also take critical understanding of the discrete generation so-called or termed

"Digital Natives" or "Net generation". The evidence from the survey was draw from the first year undergraduate university student which undertakes a range in applied or pure subjects. Questionnaire was administered to the students in all the five participating institutions. The collection tool model data was about use of technologies in their social life and for study purpose. Their findings concluded that the generation is not homogenous in its use and appreciation of new technologies and that there are significant variations among students that are in the range of Net Generation Age.

Rideout et al. (2010) scrutinized the need to understand the role of media in the lives of young people, which is essential for those concerned about promoting the healthy development of the children and adolescents, including parents, paediatricians, policymakers, children advocates, educators and public health groups. The study was based on national representative survey of 2002 3rd-12th grade student aging 8-18 years, including a sub sample of 702 respondents who volunteered to complete seven days media diaries self-administered and written questionnaires in the classroom. Trained interviewers were present in each classroom to provide assistance if needed. The results of the study provides a strong empirical data that will offer a reliable foundation for policymaker trying to craft national media policies, parents urging to do their best to stay informative about children media habits, educators and advocates that are interested with the impact of media on youth.

Corrin et al. (2011) surveyed on one of the case studies of a profile of a digital native student who seem to considering themselves as advanced users of technology, still demonstrate a wide variance of technology adoption and appropriation. One of the fourteen case studies complied as part of a huge study was a student of first year education student that proved a high level of technological literacy and a wide variety of technology adoption. The research was a mixed method approach comprised sampling survey and multiple case studies to inspect the adoption and use of technology of fourteen students at an Australian University. The case study provides educators with more insight understanding of the diversity of technological practices among this generation of learners. It will also help inform need about the integration of technology into teaching and learning.

Bullen et al. (2011) examined a comprehensive review of the research and popular literature (ICTs in Higher Education) and used an empirical study at one postsecondary institution in

Canada. The study findings based on focus group interviews with 69 students and survey responses from a random sample of 438 second year students in 14 different programs in five schools in the institution showed that there are no basic generational differences on how digital learners say they use ICT or possess a behavioural characteristics. The students are said to use limited set of ICT which can be driven by cost, familiarity and immediacy. The results of this investigation add more questions that generation used to explain the use of ICTs in higher education.

Bennett (2012) revealed that the term "Digital Native" by Pernsky (2001), Net Generation by Tapscott (1998) and other numerous labels applied to the same supposed phenomena is misapplied when used to generalise about entire generation, and instead indicated that only small sub-set of the population possessed the characterisation. The study combined key findings where from Europe, North America and Australia, predicts future directions for research in this area. The research showed significant diversity in the technology skills, knowledge and interest of young people; however suggested that there are vital digital divides which are ignored by Digital Native concept.

Gallardo (2014) presented a different perception of what these digital learners thinks about their use of digital technologies for academics and social purpose. The study further in-depth to achieve a full understanding of what the rapid use of new digital technologies means for teaching and learning in the higher education. The main data collection techniques used was online questionnaire, literature review, and semi-structured interview. The research was conducted in two phases. The first phase was the quantitative data via an online questionnaire and the second phase was qualitative data via semi-structured interviews with the same sample of 40 students in the both phase of the study. The findings suggested that technological knowledge of students cannot be used to represent the Digital Natives Generation. The findings also identify that the vast majority of students use different and particular digital technology in their everyday lives and do not support the claim that there is a substantial gap between more technologically adept younger student and older classmates.

Gallardo et al. (2015) surveyed in-depth of twenty education students at a public face-to-face interview at the university in Catalonia on how they use digital technologies in their academics and social lives. The findings gathered showed that the way the students use

technologies varies according to their purpose and that student possess certain level of competence in digital technology. It also elaborated more that social networks and social mobile applications assist students to communicate and connect people to share interests.

Generally, there are diversity and variation on how children use or access technology, which might be caused due to the environment on which the children find themselves, different interest in use of technology, socioeconomic, technological facilities and advancement in technology.

2.3 How Digital Child Characteristic's Affects Learning and Teaching

Jakes (2008) investigated the new digital development and the reflective implication that it holds for the future of education. It also processed to answer questions about current neuroscience and psychological research about how the instant messenger generations brains are being re-wired. The study surveyed was a qualitative review on literature research and its findings shows to understand the digital kid's characteristics which was listed and how they are changing the learning and teaching system through these characteristics.

Thompson (2010) investigated the claims made by notable researchers about "Digital Native" Generation concept as learners by exploring the relationship between technology use, productive learning habits and digital characteristics. The researcher developed their data collection tool which is a questionnaire because at the time of the research there was no existing instrument in the literature that disintegrates the research question. Its instrument was structured around the ten digital learning characteristics described in its analysis. Data response from 388 new students at a large Midwestern land grant university, identified with the claims being about their productiveness and learning style. The result showed some positive reciprocal relation between use of digital technology and the characteristics assign by the popular researchers to the Digital Native learners or Net Generation. The basic results showed that the little or moderate relationship indicates a determinable between technology and learning that what the popular research writers claims.

Cohen et al. (2011) explored young children use of touch screen device and increase understand of iPad potential for use as an educational tool by young children. A sample of sixty children between 2-8 years old participated, in order to meet the goals a qualitative method was designed for the children and their caregiver as well. The findings showed that young children at the age of 2 years access play and learn with touch screen devices. Their reactions initially are characterised by passion and carved by their development level on experience with technology and the design of application interface, which exposes several type of learning that occurs while playing.

Craft (2012) explored and gathered two set of clue that are around the digital childhood in the connected world and the other set that do with what this mean for educational futures. The study discussed viewpoints on childhood and youth which might inform educational provision regarding the rapid and steady unpredictable change in the 21st century Digital Childhood which it captioned as possible thinkers. The study argued to co-create with students their education futures through the 4 Ps; Playfulness, Participation, Possibilities and Plurality which are draw from work with schools.

Blumberg and Fisch (2013) described reasons why developmental psychologists should care about children and adolescents digital game play. These reasons can be identified as; development research has the potential to contribute to effective educational game design; digital game play contributes to learning and cognitive development; digital game play is an integral aspect of children and young youth lives. In the absences of empirical evidence they expanded these reasons with the aim of introducing or reintroducing the development psychologist a rich and very relevant context in which to examine children and adolescents applied cognitive development.

Kurt et al. (2013) analysed the purpose to draw attention to digital native and digital immigrant characteristics, reflecting to learning and teaching experience and also the concept "Digital Settler". Based on their non-empirical evidence, it is important to determine these groups well and take all necessary precautions mostly in the educational environments. In this regard, the Digital Native characteristics owned by Digital Settler will minimize the disagreement and lack of communication between the learner and teacher in the educational environments.

Roodt (2013) surveyed to identify if the use of YouTube in the classroom had effect on the engagement of Net Generation students, also how YouTube was used in the classroom and how student felt about it. The key point of the research was exploratory as it aims to discover what the effect of using YouTube in the classroom has on student engagement. The data collection was an online questionnaire which comprised quantitative and qualitative. It responds was from 156 students. The research found that the use of YouTube in the classroom had a positive effect on overall engagement and also on emotional, behavioural and cognitive engagement.

Chaudron (2015) presented the driving qualitative study which aims at exploring young children and their families experience with digital technologies such as tablet, smartphones, and computer games. The study was conducted in six European countries with seventy families. It focused on cross-examining children that consume digital technology at least once a week, between 6 and 7 years old and at least one parent of the family. It presented it results and discussed the findings at cross-national level and concludes on recommendations to parents, industries and policy makers.

The use of modern technology has digitalised the classroom hereby changed the old modern of chalk and blackboard into a projector especial in the developed countries. Children now prefer main to learn through multimedia devices. It has also changed the teaching methods.

2.4 Approach that can be adopted by Educator to Enhance the Digital Native Knowledge with Respect to their Digital Characteristics

Prensky (2005) designated the need to understand the natives by advising educators to bring student whom he tagged "Digital Natives" into the educational system in order to close the gap between traditional educational systems in the digital world, otherwise face the challenges of losing the student interest in the classroom. Based on the qualitative research Pernsky suggested that teachers can't keep on using 20^{th} training and knowledge to fully educate student in the digital world. He considers new approach of teaching that can capture the interest of the student such as using electronic gaming technology to study. The result showed a list of some approach which can be adopt by educators to enhance both from

"native" knowledge and also accomplish their obligation to educate students now and in the future.

Solesa and Grijak (2006) analysed some of the possible solutions of problems of teachers adjusting towards the role and educational process to cognitive needs of new generation that could implement in primary schools. Further with its findings indicated didactical games as a way of learning based upon digital language. Through the literature reviewed of research, it showed that digital generation challenged the existing system of education and input great demands. It suggested that teachers have to adjust and learn the new language in order to understand needs and abilities of new generation. Due to the reason, teachers so called "Digital Immigrant" when student noticed teacher bad accent regarding their digital environment, then they began to suspect in their competency. Solution is said to digitalize literacy of teachers.

Bayne and Ross (2011) described a condemnatory approach to a debate still commonly applied in our discussions and views of the relationship between practitioners in the higher education and the new digital technologies. The paper addressed for more careful critical and nuanced understanding of the effect of new technologies on the practices and positions of learners and teachers in higher education.

Bittman et al. (2011) studied the development of vocabulary and traditional literacy in children aged from 0-8 years; their access to digital devices; parental mediation practices; children use of digital devices as recorded in time time-diaries; the association between pattern of media use and family context on children learning. The research was conducted using data from longitudinal study of Australian children, data obtained in waves, using a combination of a face to face, self-completed questionnaire, a child's time –use diary and a teacher report. The analysis showed the importance of the parental context in framing media use for acquiring vocabulary and suggested that computer (not games) use in associated with more developed language skills; independently that exposure to television is not harmful to learning.

In order to keep in track with the digitalised teaching and learning, educators and technologist have been able to develop some approach or strategy to be adopted by teachers and ministry of education in order to cope with the modern children digital characteristics.

CHAPTER 3

CONCEPTUAL FRAMEWORK

This chapter is designed as a medium to meet the needs of informing researchers and professionals about the Digital Natives new characteristics and fill the gaps about lack of theoretical framework and scientific research that explain present-day main characteristics of Digital Child. It also identify factors that to be considered while characterising the Digital Child, which are really missing in some notable research theories about Digital Native or Net Generation Concepts.

3.1. History of the Internet

During the 1970s the American division of Defence gathered a group of scientists to help design and develop a network in case of an assault; army advisers urged the capabilities of being capable to function one computer from more terminal. Initial, scientists once used the internet to contact each other customarily (West encyclopaedia of America Law, 2005). One basic early problem antagonized via web customer's usage was speed rate. Mobile lines would most effective transmit information at a constrained rate. Later the development of fibre-optic cables allowed for billions of bits of data to be acquired every minute. Firms like Intel developed fast microprocessors, which ease and allow private computers to process the incoming signals at a faster rate.

Within the early 1990s, the world-wide internet was established, in enormous part, for business functions (Ian, 2004). Organisations created home pages where they could position textual content and images to sell products. Soon airline tickets, inn reservations, books, and even automobiles and houses might be bought on-line. Colleges and universities posted research knowledge on the web, so students might in finding valuable information without leaving their dormitories. Corporations rapidly found out that work could be completed at residence and submitted on-line, so an entire new dimension of telecommuters originated to earn a dwelling from residence offices. New varieties of communique had been introduced. Electronic mail, or e mail, used to be a convenient option to ship a message to pals or

acquaintances. Messages would be sent and bought at the convenience of the person. A letter that took a few days to reach could be read just a click on the send button. American online and CompuServe which are the first internet service providers develop electronic chat rooms (Ken & Matt, 2009).

Supporters of the web mentioned its many advantages. The industrial possibilities had been immeasurable. Convenience used to be basically multiplied. Chat rooms and email permitted participants to converse who could certainly not have had the possibility in the past. Educational possibilities have been broadly better when you consider that of the wealth of potential now placed on the fingertips of any wired man or woman. Surfing the web develop to become an exercise in and of itself.

A lot Critics electrifying that the internet shaped a technological divide that enhanced the gap between the haves and have-nots. People who might no longer have enough money for a computer or a month-to-month access cost had been denied these potentialities.

We must also promote global access to the Internet. We need to bridge the digital divide not just within our country, but among countries. Only by giving people around the world access to this technology can they tap into the potential of the Information Age (Al Gore IPI speech 2000).

Current studies in different trains, for example, Education, Communication, Media Studies, Psychology, Law, Business, and Sociology, recommend that today's youngsters think, learn, mingle, shape personality, and look for data diversely in this computerized data age, the period of Web 2.0 and of participatory society. A few terms are connected to depict individuals from this remarkable generation who are growing up submerged in digital technologies from the begin of their lives, including the Net Generation, 21st century learner's students, Digital Natives, and Digital Age Youth. As a rule, researchers characterize these gatherings as including people who were conceived following a specific year. There is no exact year taking into account solid observational information to sort the parents (Digital Immigrants) of this present day generation.

The characterization of individuals into Digital Natives and Digital Immigrants is dubious. Some Digital Immigrants surpass Digital Natives in educated, however there is a conviction that early introduction to technology in a general sense changes the way individuals learn. The genuine grouping of individuals into immigrants and natives is dubious as the adoption of digital technology hasn't been unified around the world. For North America, a great many people conceived before 1980 are viewed as Digital Immigrants. Those nearer to the cut-off are here and there called "Digital Intermediates", which implies they began utilizing computerized innovation as a part of their initial teenagers and consequently are nearer to Digital Natives as far as their comprehension and capacities.

In a two-section arrangement entitled "Digital Immigrants, Digital Natives" Prensky (2001a and 2001b) utilizes a similarity of local speakers and outsiders to portray the era crevice isolating today's understudies (the "Digital Natives") from their educators (the "Digital Immigrants"). The Digital Natives Prensky portrayed are encompassed by digital media to such a degree, to the point that their exceptionally cerebrum structures might be unique in relation to those of past eras: We can gain much from taking a gander at the Digital Natives and Immigrants as separating societies, however we require not take the similarity too far. Instruction needs to adjust and develop with the times, and teachers need to comprehend the learning styles of their understudies, however we don't need to expect that our understudies are unequipped for gaining from or speaking with the Digital Immigrants. There is need for teacher's to change the educating and learning styles.

3.2. Digital Immigrant

The expression "Digital Immigrant" are person who was conceived before the broad selection of digital technology and was utilize to separate other generation against the technological moulded generation "Digital Natives" (Prensky, 2001a; 2001b). It might likewise apply to people who were conceived after the spread of digital technology and who were not presented to it at an early age (from Techopedia). Digital Immigrants are the inverse of Digital Natives, who have been connecting with innovation from adolescence (Prensky, 2001a).

Digital Immigrants are accepted to be less quick to get new innovations than Digital Natives. This outcome in what might as well be called a talking accent with regards to the route in which they learn and adopt technology. A generally utilized illustration is that a Digital Immigrant may want to print out a report to alter it by hand instead of doing onscreen altering (Zur and Zur, 2011).

3.3. Digital Natives or Net Generation

According to Prensky (2001a) Digital Natives, this is an off spring of Digital Immigrants. The tag "Digital Native" was made open by him as a demonstration to separate youngsters who were exceedingly innovatively proficient and occupied with utilizing technological gadgets. His case was expected inundation in digital technologies from birth, which makes more youthful individuals think and gain unique learning styles in contrast to older generations. Another researcher, Tapscott (1998) thought of the same thought, calling it "The Net Generation". What's more, there have been various names about this era in which Prensky determined the year of birth and bringing on disputable agreement within a few researchers (Jukes, 2008).

The Digital Natives Generation has experienced childhood in new digital landscape. They have spent their live in the totality, having the advanced gadget or device encompassing them. Steady introduction to digital media has changed the way these Digital Natives handle, interface and access data. As a consequence of this their genes convey in fundamental distinctive way than any past existed generation. Despite the fact that a large portion of Digital Immigrants, battle to acclimate to terms with quick change, intense new innovations and change in thinking that are not local to their generation (Jukes, 2008). The Digital Natives was consented to be a solid individual from a homogenous gathering of the Digital generation that has ascended with and are drenched in digital technology (Kennedy et al., 2010). Consequently, Digital Child can be said to be Digital Native, a youngster conceived amid the presence of digital technology particularly amongst outset and youth.

3.4. Who is a Child?

Youth is the age traverse extending from birth to youthfulness. As indicated by Paget's hypothesis (Mcleod, 2009) of psychological advancement, youth comprises of two phases: Preoperational stage and cement operational stage. In formative brain science, youth is isolated up into the formative phases of toddlerhood (figuring out how to walk), early youth (play age), center adolescence (school age), and pre-adulthood (pubescence through post-adolescence). Different youth elements could influence person attitude formation.

3.4.1 Digital Child

The "Digital Child" is the tyke that has appeared on the scene where he or she spent his or her life in a digitalized environment (Jukes, 2008). These youngsters swim in the ocean of modern information technology and communication (Layton, 2000). The youngster can be said to be digital in light of the fact that he or she never known a period when computer technology were not an indispensable piece of day by day life or a period when speaking with other human in other topographical area was difficult (Jukes, 2008; Layton, 2000).

In the digital world, time and area are not all that indispensable variable in light of the fact that with the foundation and utilization of the web, youngsters can discuss viably with other individuals in various society, area and with remote tongues. A standout amongst the most imperative parts of the Digital Child is the associations with other human in which learning connections shape the fabric of the youngster presence (Layton, 2000). One of the significant difficulties going to the Digital Child is the learning style in which some looks into or creator has talked about a great deal. Amid the twentieth century, in numerous classrooms, the old convention educating was a bit of chalk and a writing board. It was hard to find a classroom having an overhead projector and multi-shaded pens, but the present world is choosing more high technology than any generation. Today's childhood have entry to PCs, the Internet, email, telephones, MP3 players, computer games and advanced cameras. These are devices and toys with a customised capacity of advanced digital technologies. These kids have disguised the digital media and underestimate it totally not to adjust to it (Jukes, 2008).

Therefore, Digital Child can be seen as an integral part of a digital native because of its environment of existence on which the child spent the lifetime and not only time of existence. It is needed to understand that many of the Digital Native is Digital Divide and not possible to claim to be a Digital Child, which may be caused by social culture, economically situations, religion belief and so on. This also applies to the characteristics of a Digital Child might definitely defer from that of Digital Native because the Digital Child is a child between the infantry and youth age that spent his or her whole life in digital environments without been digital divided .

3.4.2 Digital Divided

Digital Divided was also a tag name popularized by Pernsky (2001a) used as a gap to distinguish between digital immigrants, who he claimed that are not born into the digital landscape, never speaks digitally as their first language and the digital natives. Digital immigrant speaks digital as their second language and often called as Analog Parent because they come from the non-digital world and they came to the existence before digital technology changed everything. And as a result of their old life styles experiences, they have old traditions and assumptions about the world (Jukes, 2008).

Been Digital Divided has also exist in Digital Child, so many children that are called as Digital Native are not perfect to be called as a Digital Child because of lack of digital environment to access technologies and use these modern technology effective. This has been an important issue over some developing countries of the world. Some of the characteristics claim about so-called Digital Natives should not to be considered based on the digital environment but also considered significant variations over inadequate technological environment and diversity in technology, which open the door of Digital Divided in Digital Natives (Bennett, 2012).

There is technology diversity over Digital Natives based on technological experience. So there is a need to understand the technological diversity among this generation of learner. This understanding will assist educator to select the best choice of technology to integrate into the teaching and learning in higher education (Corrin, Bennett & Lockyer, 2011)

3.5 The Factors to be Considered While Classifying Characteristics of Digital Child

Technological development is the fastest grow development in the world, but some children are been Digital Divide. The children may not be endangered to the situation of the country economy currently, but may be affected by low rate of information technological development or advancement. Therefore, there are crucial factors that may affect the development of the so-called Digital Native, such as

- **Religious belief**: Some Religion sees technology as a medium that corrupt or divert the main childhood behaviour, which parent intend to keep more away technological activities during the childhood growth (Rahayu and Lim 2016).
- **Socioeconomic development**: International Labour Organisation (ILO) estimated that almost half the world's population still lives on the level below US$2 a day. Having a job doesn't guarantee the ability to escape from poverty in most developing countries. This slow economic development progress mandates us to rethink and retool our economic and social policies aimed at splitting world poverty by 2015 (the Millennium Development Goals). Poverty is a big threat affecting the technical development of children. Some parents welcomed that information technology has played a very vital to their development and success of their children. Perhaps, not every child gets the best in education technology as others due to low socioeconomic areas that cannot afford to provide schools with bundles of computer education and technology, especial in developing countries. Due to this purpose, children are exposed to be divided and not getting similar chance as others to be digitalised (Singh, 2015).
- **Technological Diversity**: There are basically differences in use of technology among young youth or children which are based on environment, skills and area of interest (Bennett, 2012).

Therefore what can be said to be the unique characteristics of the so-called Digital Native (Digital Child), since every researcher has a different list of characteristics that they seem to justify the definition of the generation, and while there are great overlap differences between the list (Thompson, 2013).

Perhaps, there are factors to be considered based on characterizing Digital Child, regarding to diversity in the technological environment in which some popular researchers have not really identify (Bennett, 2012). These factors can be diversity in technology, advancement in technology, socioeconomic differences, and inadequate digital environment. These factors are considered to be important factors before listing out characteristics of digital natives (Digital Child). While defining the characteristics of the Digital Child, one can view that it may come across a range of Digital Divide in the Digital Child. Around the world, children and youth have a high percentage on the use of the internet in developed countries (Pew Research, 2015). It can be said that the developed countries have wider access to the Internet at affordable rate, either via personal computer at home, work or via public terminals in Internet cafes and public libraries, but in developing countries, there are still undeveloped facilities in terms of modern technological development. The table 3.1 below shows the comparison between the Digital Native and Digital Immigrant (Zur & Zur 2011).

Table 3.1: Comparing the Digital Native behaviour against the Digital Immigrant (Adapted from Zur & Zur, 2011)

Younger –Digital Natives	Older- Digital Immigrants
COMMUNICATION	
• Prefer a sequential communication, such Facebook, chat or email	• Prefer synchronistic communication, in real time, such as phone conversations or face-to-face
• Teen's text more than call	• Do not use text, but use it reluctantly and sparingly
• Use instant message shorthand for texting: luv u, r u coming, cu later	• Use and value proper English
• Choose to connect through Facebook, online games and chat	• Choose to talk in person or on phone
• Gather news via Twitter, Facebook and political blogs. Traditional news not a central piece for news	• Get their news via hard copy newspapers , traditional news sites (New York Times, local papers)

WORKING ETHICS AND PROFESSIONALISM

• Work irregularly 7 days a week; alternate among play, work, socializing etc. No end to the week- regular flow	• Always rely on the 5 days working days followed by an off-weekend
• Practise many careers during lifetime and switch workplace, work settings.	• Hoping they will work their way up the ladder in the workplace, in a linear fashion, in one firm, in one career
• Stability, security and Pension are not highly valued as variety , experience which natives see as essential to vocational satisfaction	• Stability, security retirement and pension are highly valued
• Have much concerned with personal satisfaction. Self-focus rather than company. Might change jobs always as new skill are developed and area of interest.	• Value steadiness and loyalty at work palace
• Prefer to switch focus and alternate between work, play social networking .and more productive and happy with their work styles.	• Always focus on work-related matters during working hours
• Prefer telecommuting and flexible work hours to make up work remotely ,i.e. on vacation or weekend d cafe	• Prefer central work place, don't intrust telecommuting during work hour.
• Foreseen the workplace more as classless terms and less in ranked (top-down) ideology.	• Hierarchical approach to workplace rather than sovereign or democratic one

LEARNING STYLES

• Don't relate to manuals. Solve issues spontaneously. As Spontaneous learners, they engaged in rapid trial and error actions and prefer discovering actions, interaction and experiment rather than by reflection	• Accustomed to and prefer instruction manuals with clear sequential steps. As reflective leaner they like a logical and linear process of discovery
• Tending to read texts in short rush, one paragraph at a time, in order to engage in other activities such as Facebooking and	• Leans towards reading a book from cover to cover

texting. • Prefer interacting and processing with graphics, sound and pictures and video before text	• Prefer interacting firstly with text before pictures
SOCIAL LIFE	
• Hang out online and offline, i.e. Facebook, texting and concerts and party respectively.	• Prefer hanging out in person, clubs dinner etc.
• Use the internet to socialise, have fun, watch movies, shows, play etc.	• Use mainly to gather vital information
• Interact network always with many people as well with best friends	• Prefer to have quality interaction with one or few people rather than many
• Expose highly personal information on the social networking sites	• Privacy is highly observed and limits self-disclosure to few circles of friends.
• Prefer instant gratification and rewards, oversee value.	• See high value in late satisfaction and rewards
IDEOLOGY	
• Believed that internet is as real and often more fun, pleasurable and tangible than offline.	• Think the internet and virtual world are not part of real life
• A lot aspects of life are taking place only online	• Think the natives waste their lives online
• Prefer multitasking and task switching, taking several tasks or recreation activities at a time	• Prefer doing one task or pleasure at a time
• See learning as fun and always acquire knowledge via fun activities such as surfing web , social networking and gaming	• Learning is a necessity and is always inevitable chore

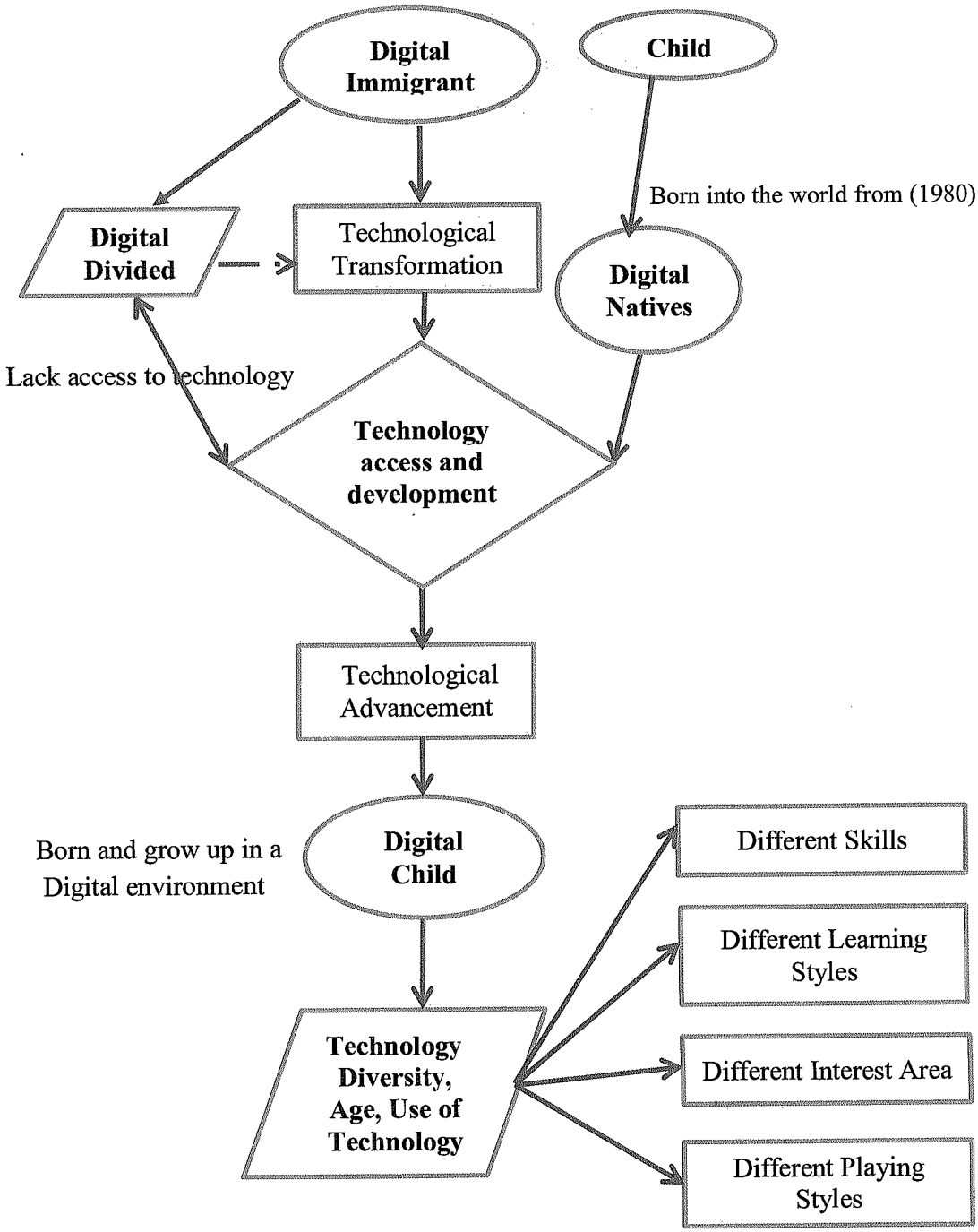

Figure 3.1: Theoretical framework that characterised the digital child

The model describes technological transformation and Digital Divided that are noticeable by both digital immigrant and Digital Native. Digital Immigrant (i.e. a person born before the adoption of technology) undergoes a technological transformation which consists of adequate technology use or access. Lack or inadequate to technology after transformation can also lead to digital divided due to technological advancement.

Digital Natives (i.e. a person or child born during or after adoption of technology), they don't possess or exhibit any digital characteristics until they have access, use and experiences technology in their daily activities, hereby considered as Digital Child. Digital children possess technological diversity based on age and moreover use of technology, which enable them to express different skills, learning styles, area of interest and playing styles.

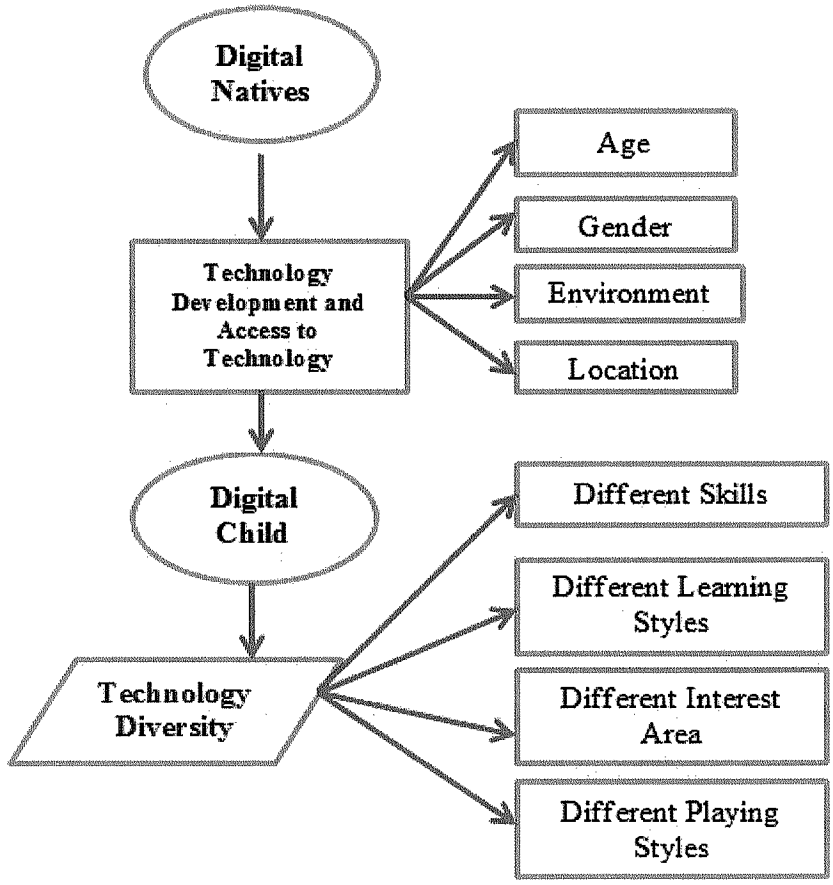

Figure 3.2: Theoretical framework that characterized the development of digital child

Digital Native is a general name tagged to a specific generation. They possess Digital Characteristics or behaviours only when they have been integrate, use or access with technology in which some element (i.e. age, gender, environment and location) to be consider in order to categorise them as Digital Child.

Digital Child is one that grew up in a Digital environment and use technology always. They also show high level of digital diversity among them. This diversity ignites difference in their way of learning, playing, skills and area of interest.

3.6 Modalities and Presentational System

Modalities allude to how student utilize their senses in the learning procedure. We usually consider four modalities: visual (seeing), sound-related (hearing), kinaesthetic (moving), and material (touching). The more senses or modalities we can initiate, the all the more learning will occur. The considerable greater number of youngsters can learn utilizing every one of the four modalities, but we all have inclinations that can be profited by. In the classrooms, we should give a situation that is helpful for every one of the four. Customary classrooms depend intensely on sound-related incitement. Since we have considered the formative qualities of youthful puberty, we understand that visual, kinaesthetic, and digital modalities additionally assume play strong role in immature lives. Every youngster has favoured representational frameworks (Powell, 2013). For instance, when discovering some new information, some of them may want to see it or envision it performed, others have to hear how to do it, others have to get an inclination for it, but then others need to comprehend it. By and large, one framework is not superior to another. Notwithstanding, contingent upon the connection, one or a greater amount of the representational frameworks might be more compelling: scene painters - visual, performers - sound-related, competitors - kinaesthetic and advanced (Losier 2009). Utilize the Law of association and learning modalities the four measurements (Learning Style, Multimedia Visual and kinaesthetic, multitasking, playing Styles) of digital attributes were determined in view of setting and representational frameworks.

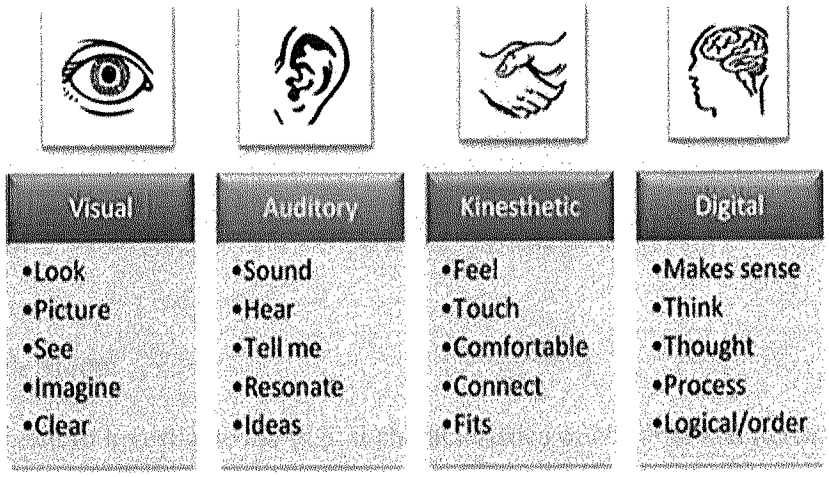

Figure 3.3: Law of connection (Losier, 2009)

3.7 Children Use of Technology

With regards to technology, kids are not just beginning to utilize it at a more youthful age, however are utilizing it as a part of more differed circumstances, both at home and at school. Today, technology for children is a wellspring of learning and excitement.

Youngsters use books, touch screens, composing instruments, and devices for concentrating on logical and social ideas. As digital technologies progressively turn into the instruments that more established youngsters and grown-ups use in their work and home lives, more youthful kids try to copy this utilization, first through impersonation and representational play and after that later through dominance of the devices for their own particular self-expression and learning.

CHAPTER 4

METHODOLOGY

In this chapter, it explains the research methods or model, participants, data collection and tools, and data analysis in which the research is being carried out.

4.1. Research Model

This study aimed to investigate the digital characteristics of children and perception towards use of technology and digital learning amongst primary school pupils in Nigeria, hereby taken within a frame of a control group, based on opinions.

The independent variable of the survey consists of four variables: Age, Gender, Type of School, and Location. The dependent variables were Use of Technology (UOT), Learning Styles (LS), Multimedia, Visual and Kinematics (MVK), Multitasking and Playing Styles (PS). Child development age grouping by centres for diseases control and preventions middle childhood age 9-11 and young teens 12-14. Having very low percentage on age 10 then group together with age 9 which have a very high percentage.

The research questions of the study have taken towards a scientific framework. Table 4.1 shows the dimensions and descriptions of the related items of dependent variables. The research model figurative view and meanings are shown in Figure 4.1

Table 4.1: Related items of dependent variables of the study

Dimensions	Items
DUOT	Q1,Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15,Q16,Q17,Q18, Q19
DLS	Q20,Q21,Q22,
DMVK	Q23,Q24,Q25,Q26
DMULTITASKING	Q26,Q27,Q28,Q29,Q30
DPS	Q31,Q32,Q33,Q34,Q35

Note: DUOT = Thoughts about Use of Technology
DLS = Thoughts about Learning Styles,
DMVK = Thoughts about Multimedia, Visual and Kinematics
DMULTITASKING = Thoughts about Multitasking,
DPS = Thoughts about Playing Styles

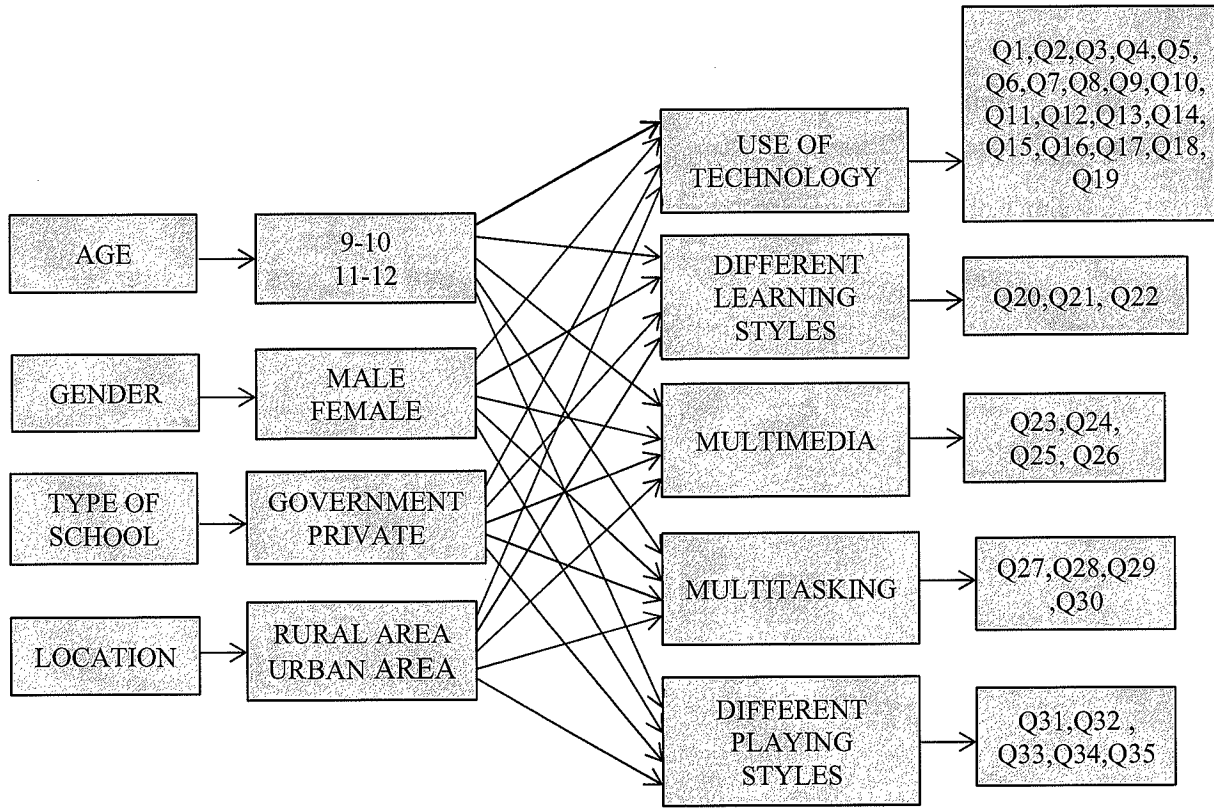

Figure 4.1: Research model of the study

4.2. Research Settings

This study is a descriptive one and was conducted at South East (Imo and Enugu) of Nigeria. A multi-stage sampling was used to select schools and participant of the study. At the selected schools in urban and rural area a purposive random technique was used in selecting a sample of 510 pupils. The analysis of the study was carried out at Near East University during the 2015-2016 Fall Semester.

4.3 Participants

The participants used in this study, were chosen using a multistage sampling and they consisted of a total of 510 children. This study involved a survey and focus groups ranged 9-12 years old, with the participant's average of 11.3%. From the table 4.2, 48.20% of the children were within the age group of 9-10 years old while 51.80% were within the age group of 11-12 years old and were made up of 52.5% (268) boys and 47.5% (242) girls attending different public and private schools. The percentage of children from Government schools was 63.10% while private schools were 36.90%. The sample was a purposive one and is not nationally representative. The 48% of the children were from rural area and 52% children were from urban. The characteristics of the respondents are presented in Table 4.2.

Table 4.2: Important demographic data of participants (N = 510)

Characteristic	Frequency	%
Gender		
Boy	268	52.5
Girl	242	47.50
Age		
9-10	246	48.20
11-12	264	51.80
School		
Government	322	63.10
Private	188	36.90
Location		
Rural area	245	48.00
Urban area	265	52.00

Children identified as rurally based are from households based in small town and villages, as well as households in the countryside.

Table 4.3: Types of schools participated in the study

Name	Type	Description	N=510	%
School 1 (government)	Rural	Rural outside small town: Area which is growing in population, with increasing new Development.	195	76.9
School 2 (private)	Rural	Rural, in fast-growing commuter town: The town has experienced massive Population growth and urbanisation in the last decade.	50	20.4
School 3 (government)	Urban	Urban, designated: Located in a central city Neighbourhood. The school has a majority of students from non-traditional households and lower income groups.	127	47.9
School 4 (private)	Urban	Urban: accommodating students from diverse backgrounds, though predominantly from higher income families.	138	52.1

For the purpose of analysis, school designation is taken as a broad indicator or proxy of socio-economic status. It is acknowledged, however, that many schools have a mixed population and limited inferences are made on the basis of school type, principally in relation to diffusion of technology and the presence, or otherwise, of a digital divide.

4.4 Data Collection Tools

The survey tool used for data collection was a paper based questionnaire, "*use of technology among digital children in the 21st century*" which was adapted and modified from (Downey, Hayes and O'Neill 2007). However, "*digital characteristics of children in the 21st century*" was developed by the researcher. The content of the items was examined and

reviewed by experts in the Department of Computer information systems and Computer Education and Instructional Technologies in the Near East University. Some items were revised based on the expert's comments. During the study 585 survey were administered, 540 (92%) was retrieved, while 510 (87%) was accepted for data analysis. The questionnaire was anonymous and carried out amongst the children. The sample obtained reflected urban, rural, gender and socio-economic variations, and the means of achieving this was through ensuring a balance of school types. All items represented a positive reaction to the characteristics of digital child and the questions are closed-end items.

Demographic Information: Request the participant information such as: gender, age, school and location.

Use of Technology: The aim of using this questionnaire was to acquire more insight on children opinion regarding use of technology in their everyday lives. It was adapted and modified from Downey, Hayes and O'Neill (2007). It consists of (19 items) used to identify how children use or access technologies such as; computer, games, internet, mobile phone, and other mobile applications. The survey was rated by the respondents using a 3 Likert Scale from "Yes" (3 point), Sometimes" (2 point"), "No" (1 point). The Cronbach's Alpha is .995 (See Appendix 3)

Digital Characteristics: The objective of using this questionnaire was to achieve more knowledge about digital characteristics regarding digital Native educational development system. It was developed by the researcher and was Sub-divided into 4 major dimensions. The respondents rated the survey (all 4 dimensions) using a 3 Likert Scale from "Yes" (3 point), Sometimes" (2 point"), "No" (1 point). The questionnaire reliability was calculated to be Cronbach's Alpha of 0.991, and the average completion time was 10 minutes. (See Appendix 4)

Learning styles: Which can be also refer as Learning modalities are Perception, memory, and sensation comprise the concept of modality. The modalities or senses include visual, auditory, tactile/ kinaesthetic, it comprises of 3 items and Cronbach's alpha of .979

Multimedia, Visual and Kinaesthetic: This described children opinion about the use of audio, image, animation and interactive content. It consists of 4 items and a Cronbach's alpha of .973.

Multitasking: This is actually to understand children capability to perform two or more task at the same time. It comprises of 4 items and Cronbach's alpha of .983

Playing styles: The aim was to gain more insight of their opinion towards learning through playing and also use of digital toy devices. It made up of 5 items and Cronbach's alpha of .976. In order to enhance the accuracy of the assessment and evaluation of the questionnaire, reliability is obtained through Cronbach alpha analysis of the overall items and its dimensions.

According to the results of the reliability result in Table 4.4, it can be seen that the Cronbach's Alpha for each dimension in the scale were listed from 0.983 Multitasking to 0.973 Multimedia, Visual and Kinesthetic. Based on this result, it was decided that the scale can be used for reliable measurements gave good acceptable results. The result from this study show that the total items (scales) and coefficient of reliability of all groups are above 0.70, hence our findings shows that the scales are reliable (Sipahi et al., 2010).

Table 4.4: Reliability test for the dimensions

Dimensions	Cronbach's Alpha	N of Items
Learning Style	.979	3
Multimedia, Visual and Kinaesthetic	.973	4
Multitasking	.983	4
Playing Style	.976	5
Over all Items	**.991**	**16**

4.5. Data Analysis Method

A statistical software program, Statistical Package for Social Sciences (SPSS) which is the most widely used statistical package (Cohen, Manion and Morrison, 2005), which is used for in-depth data analyses. A questionnaire was used to collect data during the survey. Precisely, SPSS 20.0 was used to interpret and analysed Frequency and percentage, Independent sample *t*-test methods were used during the analysis process.

Creswell (2003) described that, the act of processing data analysis comprises of adequate understanding of the data. The process of data analysis is evident quantitative (descriptive analysis). Descriptive statistics: Frequency, standard deviation, independent samples t-test, mean and percentage methods were used during the analysis process. Descriptive statistics method was used to analyse, describe and present data from the survey, hereby summarise numeric data in graphs, tables or representations of scores and percentage (Cohen et al., 2007). It also helps researcher to have a good knowledge of the data, a define way to communicate results and detecting patterns (Tashakkori and Teddlie, 2003). Descriptive analysis was used to understand the opinion of the children perception regarding use of technology and their Digital Characteristics (in Dimension). However, independent sample t-test was employed to analyses the Digital characteristics differences between based on dimension, age, gender and location, while one-way ANOVA was employed to understand digital characteristics difference based on type of schools.

4.6. Procedure

Nigeria cannot afford to be behind in use of information communication technology to develop the intellectual and creativity of her citizen. This is mainly vital for children (Digital Natives) whose adulthood will be enriched with a digitalised environment. In view of the claims other researcher suggested to be the characteristics of the digital natives, it will be interesting to know if the Nigeria children exhibit it. To understand the children opinion with ICT observation was conducted among selected primary schools. The children were also allowed to talk about their use of mobile phones, the Internet and listening to music. They were also allowed to express their opinions, even if it meant disagreeing with their

peers. Information gathered was used to create a questionnaire and also adapted from other researchers since there was little or no empirical data to prove the Digital characteristics of this specific group. The first phase of the research undergoes the review of the research literature, in which information relating to the general foundation and context of the study are gathered. The researcher carried out a qualitative content analysis of research literature to discover the main characteristics of digital child. In the literature review, the researcher examine digital technology in respect to the child learning and playing (devices and software); their uses for social and educational purposes; and, the concepts, terms and characteristics of the digital and non-digital environment. The approach of literature analysis was selected in order to highlight the similarities and variations in the findings from previous research in this area, hereby develop upon previous research effort. It also cover diverse contexts such as different tasks, age groups and both everyday life set and school settings. Information-gathering was conducted from April to June 2015. Before administrating the questionnaires to the pupil's ethic consideration was observed, this comprises the "Child Assent For" and "Parent/Guardian Consent Form" (see Appendix 1 and 2). The researcher was involved in visiting each of the schools, normally spending a day in each location. The process consists of working with the children first, (9-12 year old) in groups of 2-3 at a time, helping them to complete the questionnaires through the assistance of their teacher for little explanations. Afterward the collection of questionnaires from the students, a total of only 510 correctly filled questionnaires were collected from the students from various schools, then gathered data were subjected to various analysis using the SPSS (such as; frequency percentage, independent t-test and ANOVA) in order to render answers to the objective of the study/research questions of the study. Subsequently the results from the data analysis were discussed in details and conclusion and recommendation were extracted from the results of the study.

4.6.1. Ethical Considerations for Children and Parents

Permission was requested from the Head of Schools and Boards of Management of the participating schools. Before each child was given the questionnaire, he or she will be giving a form to sign, accepting to be part of the survey. This was titled the "Child Assent Form2

(see Appendix 1). Type of schools is identified but name of schools are not identified in the report and only their general location is referred. As the survey participants are children, is important to follow all ethical conducts or code by informing the parents or guardian of each child. A "Parent/Guardian Consent Form" (see Appendix 2) was given to the parents of each participant in order to approve if the child will participate in the survey or not. A parents and head school contest form was also designed to back-up the questionnaires regarding ethical considerations. All participants were informed of the nature of the survey and of their voluntary and confidential participation.

4.7. Research Schedule

This study started in September 2014 after the proposal and was completed in December 2015. Preparation of data collection tools and data collection was also carried out during the same time schedule. Work carried out during this period are in daily task duration given in the Table 4.5. Expenses incurred during the study were financed by the researcher and not really necessary in the schedule table.

Table 4.5: Research Schedule

WORK DONE	DURATION
• Literature Researched	2014-2015
• Writing Literature Reviewed	13 Weeks
• Preparation of Research proposal	9 Weeks
• Preparation of Data Collection Tool (Questionnaire)	21 Weeks
• Review of Questionnaire	3 Weeks
• Administer the Questionnaire to Schools	9 Weeks
• Couriering Data Collected from Nigeria	3 Weeks
• Recording Data into SPSS	2 Weeks
• Data Analysis	2 Weeks
• Writing Final Phase of the Thesis	1 Week
• Review and Corrections	1 Week

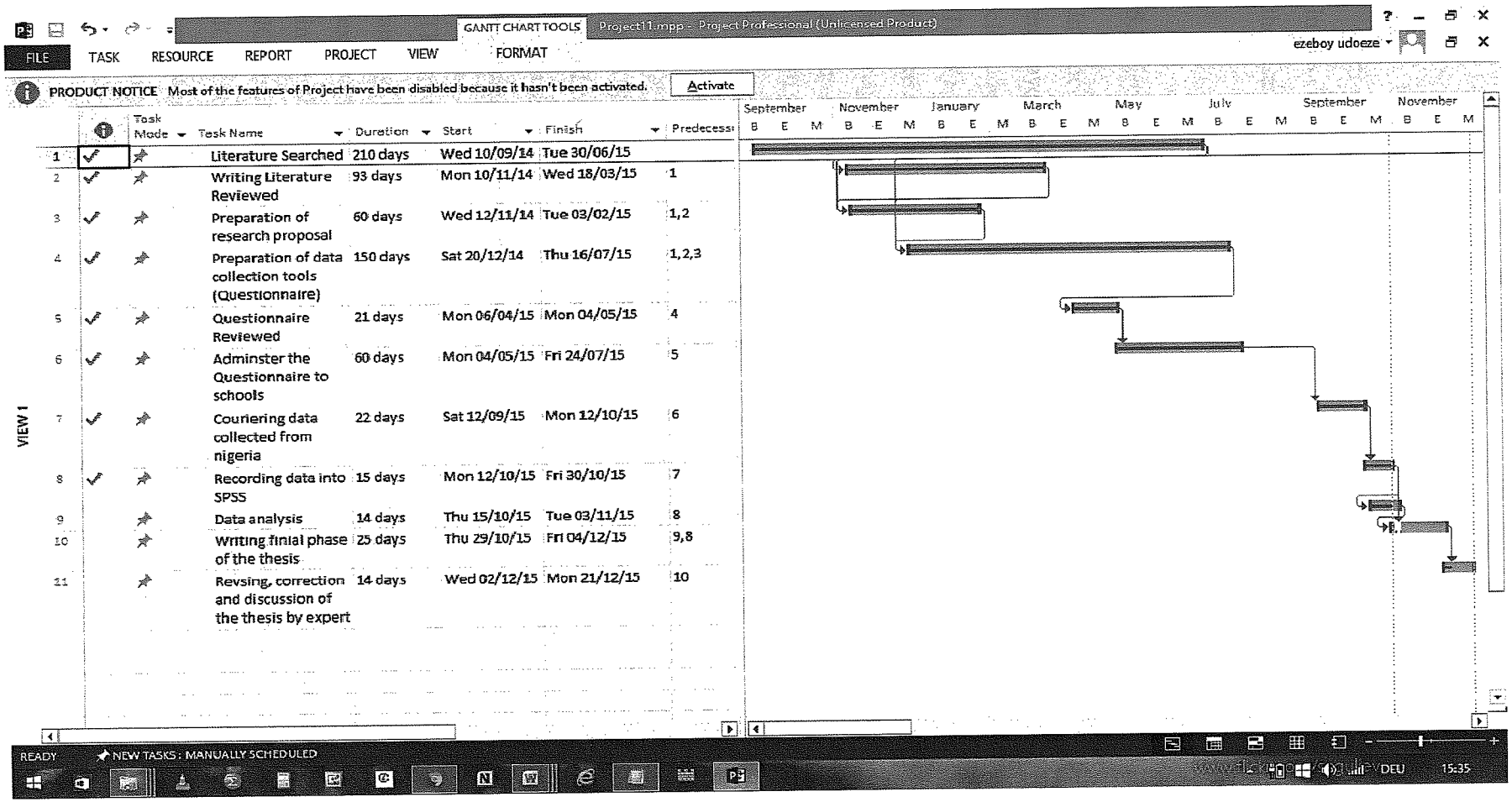

Figure 4.2: Research schedule in Gantt chart

CHAPTER 5

RESULTS AND DISCUSSIONS

In this chapter, the results found are discussed in respect to the fundamental objectives of the research.

5.1. Use of Technology among Children

In order to understand the use of technology among children, descriptive analysis was employed. According to the result on Use of Technology (UOT), the children gave very clear view based on what they practices in terms of use of technology. From the results in Table 5.1, shows the mean range all items. Item (1, 3 and 4), which gave the highest two response value out of all items. Item (1) "I have a mobile device" (M = 2.19; SD = 0.85), with regard on the result 28.4% yes, 23.9% No and 47.6% sometimes and Item (3), "I have a computer or Laptop at home" (M = 2.19; SD = 0.81), with regard on the result 25.5% yes, 29.8% No and 44.7% sometimes. This indicates that below average percentage of the children have phone which might be due to the socioeconomic condition of the country which above average of the population are below poverty line (National Bureau of Statistics 2010), can't afford a phone and laptop computer that have access to the internet. Item (4) "My computer or laptop has access to the internet" (M = 2.19; SD = 0.81), with regard on the result 25.3% yes, 29.8% No and 44.9% sometimes. The high cost of internet access cost and lack of adequate modern ICT infrastructures by the government have indicates the low response rate.

The total average of all items (M = 2.13; SD = 0.85) shows average use technologies among children. Based on the research conducted by Adomi and Kpangban (2010) expressed that there are major factors that associated with low or average technology usage in the Nigeria education system such as; frequent electricity interruption, lack of adequate ICT facilities in schools, poor or limited information infrastructures, non-integration of ICT education into the school curriculum, poor ICT policy and project implementation approaches. It is important to understand that ICT education is not evident in the primary education level more especially in the government or public school

Table 5.1: Frequency, percentage, mean and standard deviation for each item of UOT

USE OF Technology (UOT)		Freq N=510	%	Mean	SD
1. I have a mobile device.	Yes	145	28.43	2.19*	.85
	No	122	23.92		
	Sometimes	243	47.64		
2. My mobile device has access to the internet.	Yes	136	26.66	2.18	.82
	No	142	27.84		
	Sometimes	232	45.49		
3. I have a computer or Laptop at home.	Yes	130	25.49	2.19*	.81
	No	152	29.80		
	Sometimes	228	44.70		
4. My computer or Laptop has Internet access.	Yes	129	25.29	2.19*	.81
	No	152	29.80		
	Sometimes	229	44.90		
5. I have a Facebook account.	Yes	129	25.29	2.19	.81
	No	151	29.60		
	Sometimes	230	45.09		
6. I increased my age, so that I can open a Facebook account.	Yes	137	26.86	2.17	.82
	No	145	28.43		
	Sometimes	228	44.70		
7. I use Facebook to communicate with my friends, instead of face to face.	Yes	137	26.86	2.18	.82
	No	143	28.03		
	Sometimes	230	45.09		
8. I use my sibling (sisters and brothers) Facebook account.	Yes	132	25.88	2.19	.82
	No	149	29.21		
	Sometimes	229	44.90		
9. I can use calendar in my mobile phone.	Yes	162	31.76	2.13	.86
	No	118	23.13		
	Sometimes	230	45.09		
10. I can use alarm clock in my mobile device.	Yes	171	33.52	2.11	.88
	No	109	21.37		
	Sometimes	230	45.09		
11. I can send message (SMS, MMS etc.) to my friend with my mobile device.	Yes	157	30.78	2.14	.86
	No	123	24.11		
	Sometimes	230	45.09		
12. I can play games with my mobile device	Yes	167	32.74	2.12	.87
	No	111	21.76		
	Sometimes	232	45.49		
13. I can play games with my laptop or computer	Yes	155	30.39	2.15	.85
	No	122	23.92		
	Sometimes	233	45.68		
14. I go to the internet café to play games of watch movies.	Yes	139	27.25	2.18	.83
	No	140	27.45		
	Sometimes	231	45.29		
15. I like using mobile device for learning.	Yes	164	32.15	2.12	.87
	No	140	22.45		
	Sometimes	231	45.29		

16. I enjoy watching television program that helps me to learn.	Yes No Sometimes	248 29 233	48.62 5.68 45.68	1.97	.97
17. I use "YOUTUBE" to listen to music, watch film or cartoon movies.	Yes No Sometimes	182 80 248	35.68 15.68 48.62	2.12	.90
18. I have heard about the word "INTERNET".	Yes No Sometimes	236 42 232	46.27 8.23 45.49	1.99	.95
19. I have heard about the word "GOOGLE".	Yes No Sometimes	178 100 232	34.90 19.60 45.49	2.10	.89
Total				**2.13**	**.85**

Note: Scoring: 3 = Yes, 2 = Sometimes, 1= No

5.2 Opinions of Children on Digital Characteristics

In order to understand the opinions of children in the use of digital gadgets for learning, digital learning tools platforms and other technical learning styles, descriptive analysis was employed. From the result in Table 5.2, shows the range for all dimensions and items. In all dimensions the three highest mean value out of all items which is probably because of the high responses from the multitasking section "I do homework most of the time while watching TV, texting, listening to music or using some other medium (M = 2.22; SD = 0.86), "I do several tasks with technology device at same time" (M = 2.19; SD = 0.86), "I enjoy playing games at same time reading or studying" (M = 2.19; SD = 0.85). Since the high increase in technology usage at home and schools, the act of multitasking has also increased rapidly among children. It is more often to see a child doing or two or three task at the same time. However, use of Technology have also made it easier for children to execute more task same time. However, "I prefer playing with my friends than playing alone" (M = 1.99; SD = 0.97), "I prefer doing practical activities when Learning" (M = 2.02; SD = 0.96), "I prefer pictures and sounds objects" (M = 2.03; SD = 0.96) which gave the three lowest mean value out of all items. The total mean and standard deviation values for all 16 items in dimension is (M = 2.09; SD = 0.92). Table 5.2 shows a summary of the survey results on the children digital characteristics. At a glance the results suggest that there is average response from the children and will anticipate

integrating into data regarding the demography of the children. The reason for this result is because of inadequate technological development within the country, high cost of internet access and low ICT subject or training, which can cause low use of technology and access. However, Pernsky (2001a, 2001b) claimed that the digital natives exhibit some digital characteristics such as multitasking, playing style, learning style and use of interactive multimedia. This study indicates that Children in Nigeria displayed a low or average of these digital characteristics and suggested that socioeconomic development, religious belief and technological diversity might have affect the development of the digital natives.

Table 5.2: Scale of children opinion on the digital characteristics

Items	Mean	SD
Learning Styles (LS)		
1. I prefer learning with picture text than text alone.	2.06	.95
2. I prefer doing practical activities when learning.	2.02	.96
3. I prefer watching slides than text reading during learning process	2.11	.92
Total	**2.06**	**.94**
Multimedia, Visual and Kinesthetic than text (MVK)		
1. I easily remember anything I see.	2.03	.97
2. I prefer pictures and sounds objects.	2.03	.96
3. Picture, sound and video help me to understand better than text.	2.05	.95
4. Physical education increases my learning ability.	2.09	.96
Total	**2.05**	**.96**

Multitasking (MTK)		
1. I do homework most of the time while watching TV, texting, listening to music or using some other medium.	2.22	.86
2. I do several tasks with technology device at same time.	2.19	.86
3. I enjoy playing games at same time reading or studying.	2.19	.85
4. I like to get quick feedback from mobile device interaction.	2.17	.88
Total	**2.19**	**.86**

Playing Style (PS)		
1. I prefer playing with mobile device or digital toy than watching television.	2.13	.90
2. I do have a digital toy.	2.10	.92
3. I love playing with digital educational toy that helps me to learn.	2.07	.93
4. I prefer playing with my friends than playing alone.	1.99	.97
5. I enjoy playing online games.	2.11	.92
Total	**2.08**	**.92**

5.3 Relationship between Use of Technology and Dimensions?

The research question was to determine if there is any relationship between the Use of Technology and other dimensions (LS, MVK, MTK and PS).

5.3.1 Relationship between UOT and LS

The correlations in the main diagonal (cells UOT and LS) are all equal to 1. This is because a variable is always perfectly correlated with itself. Notice, however, that the sample sizes are same in cell UOT (n=510) versus cell LS (n=510). This is because there

no missing data.). However, one can view that the Pearson correlation coefficient for UOT and LS is .920, which is significant ($p < .001$ for a two-tailed test), based on 510 complete observations. Based on the results, it is stated that UOT and LS have a statistically significant linear relationship ($p < .001$). The direction of the relationship is positive (i.e., UOT and LS are positively correlated), meaning that these variables tend to increase together (i.e., higher UOT is associated with higher LS). Keith (1999) expressed how the use of Technology can reach the various learning styles and help improve learning by enhancing digital communication to meet the needs of different learning styles of children.

Table 5.3: Relationship between UOT and LS

(N =510)		UOT	LS	Mean	SD
UOT	Pearson Correlation	1	.920**	2.14	.82
	Sig. (2-tailed)		.000		
	N	510	510		
LS	Pearson Correlation	.920**	1	2.06	.93
	Sig. (2-tailed)	.000			
	N	510	510		

**. Correlation is significant at the 0.01 level (2-tailed).

5.3.2 Relationship between UOT and MVK

The correlations in the main diagonal on Table 5.4 shows (cells UOT and MVK) are all equal to 1. This is because a variable is always perfectly correlated with itself. Notice, however, that the sample sizes are same in cell UOT (n=510) versus cell MVK (n=510). This is because there no missing data.). However, one can view that the Pearson correlation coefficient for UOT and MVK is .929, which is significant ($p < .001$ for a two-tailed test), based on 510 complete observations. Based on the results, it is stated that UOT and MVK have a statistically significant linear relationship ($p < .001$). The direction of the relationship is positive (i.e., UOT and MVK are positively correlated), meaning that these variables tend to increase together (i.e., higher UOT is associated with higher MVK). Web-based instruction, audio and video streaming, computer-mediated communication are technological tools used in multicultural education. It also helps learners with language differences (Sleeter and Tettegah, 2002).

Table 5.4: Relationship between UOT and MVK

(N =510)		UOT	MVK	Mean	SD
UOT	Pearson Correlation	1	.929**	2.14	.82
	Sig. (2-tailed)		.000		
	N	510	510		
MVK	Pearson Correlation	.929**	1	2.05	.92
	Sig. (2-tailed)	.000			
	N	510	510		

**. Correlation is significant at the 0.01 level (2-tailed).

5.3.3 Relationship between UOT and MTK

The correlations in the main diagonal Table 5.5 shows (cells UOT and MTK) are all equal to 1. This is because a variable is always perfectly correlated with itself. Notice, however, that the sample sizes are same in cell UOT (n=510) versus cell MTK (n=510). This is because there no missing data.). However, one can view that the Pearson correlation coefficient for UOT and MTK is .939, which is significant ($p < .001$ for a two-tailed test), based on 510 complete observations. Based on the results, it is stated that UOT and MTK have a statistically significant linear relationship ($p < .001$). The direction of the relationship is positive (i.e., UOT and MTK are positively correlated), meaning that these variables tend to increase together (i.e., higher UOT is associated with higher MTK). Carrier et al (2009) Showed that there are consistent higher rate of multitasking resources and skills in younger generations regarding the technological and social environment in the United State.

Table 5.5: Relationship between UOT and MTK

(N =510)		UOT	MTK	Mean	SD
UOT	Pearson Correlation	1	.939**	2.14	.82
	Sig. (2-tailed)		.000		
	N		510		
MTK	Pearson Correlation	.939**	1	2.19	.84
	Sig. (2-tailed)	.000			
	N	510	510		

**. Correlation is significant at the 0.01 level (2-tailed).

5.3.4 Relationship between UOT and PS

The correlations in the main diagonal Table 5.6 shows (cells UOT and PS) are all equal to 1. This is because a variable is always perfectly correlated with itself. Notice, however, that the sample sizes are same in cell UOT (n=510) versus cell PS (n=510). This is because there no missing data.). However, one can view that the Pearson correlation coefficient for UOT and PS is .945, which is significant ($p < .001$ for a two-tailed test), based on 510 complete observations. Based on the results, it is stated that UOT and PS have a statistically significant linear relationship ($p < .001$). The direction of the relationship is positive (i.e., UOT and PS are positively correlated), meaning that these variables tend to increase together (i.e., higher UOT is associated with higher PS).

Table 5.6: Relationship between UOT and PS

(N =510)		UOT	PS	Mean	SD
UOT	Pearson Correlation	1	.945**	2.14	.82
	Sig. (2-tailed)		.000		
	N	510	510		
PS	Pearson Correlation	.945**	1	2.08	.89
	Sig. (2-tailed)	.000			
	N	510	510		

**. Correlation is significant at the 0.01 level (2-tailed).

Based on the results it can be stated that increase in use of technologies also show increase in its impact in human daily activities. The implementation of technology influences the values of a society by changing expectations and realities.

5.4 Age, gender, school and location affect the characteristics of Digital Child

In order to understand the depth of the study one has to determine if age, gender, type of school and location have effect on the digital characteristics of the children.

5.4.1 Digital Characteristics Based on Age Differences

In order to understand the opinions of the children' insight in the digital learning characteristics and the use technologies between different ages groups, on total average score independent samples *t*-test was employed. According to the Table 5.7, concerning

the opinions of the children' perception in digital learning characteristics and the use technologies, there are statistically significant differences between age groups among all dimension in this study ($p<0.05$).

Table 5.7: Difference between ages

	Age	N	Mean	SD	Mean Difference	t	p
UOT	9-10	246	1.92	0.81	-0.425	-5.983	**.001***
	11-12	264	2.34	0.78			
LS	9-10	246	1.88	0.91	-0.362	-4.484	**.001***
	11-12	264	2.24	0.91			
MVK	9-10	246	1.85	0.89	-0.384	-4.780	**.001***
	11-12	264	2.24	0.92			
MTK	9-10	246	1.99	0.85	-0.392	-5.381	**.001***
	11-12	264	2.38	0.78			
PS	9-10	246	1.89	0.87	-0.370	-4.788	**.001***
	11-12	264	2.26	0.86			

Note: DUOT: Thoughts about Use of Technology, DLS: Thoughts about Learning Styles, DMVK: Thoughts about Multimedia, Visual and Kinematics, DMTK: Thoughts about Multitasking, DPS: Thoughts about Playing Styles.

From the independent *t*-test result as shown in Table 5.7, there existed statistical significant difference ($p<0.05$) between UOT, LS, MVK; MTK and PS scales in both age groups. However looking at the results, MTK gave the highest responses with mean values of M=2.38, SD=0.78; UOT: M= 2.34 SD=0.78 and PS: M = 2.26, SD=0.86 for 11-12 years, While MVK gave the lowest responses with mean values of M = 1.85, SD = 0.89; LS: M =1.88, SD = 0.91 and PS: M = 1.89, SD = 0.87 for 9-10 years old. There are significant different between ages. Age where divided into two groups which are 9-10 and 11- 12 years.

According to Culter et al. (2003) showed that there is age based difference in-relation to computer usage from the survey they did on various individual of different age groups. Conversely, Downey, Hayes and O'Neill (2007) expressed that possession of media technology showed to increase in respect to age, which means that the higher the age the more likely exposure towards technology. However the results supported because age group11-12 in this study have higher mean value in all dimensions.

5.4.2 Digital Child Characteristics Based on Gender Differences

In order to comprehend the opinions of the children' acumen in the digital learning characteristics and the use of technologies between both genders, independent samples *t*-test was employed. According to the Table 5.8, concerning the opinions of the children' perception in the digital learning characteristics and the use of technologies, there existed statistically significant differences between genders in this study ($p<.05$).

Table 5.8: Difference between genders

Dimension	Gender	N	Mean	SD	Mean Difference	t	p
UOT	Boy	268	2.02	0.82	-0.244	-3.362	**.001***
	Girl	242	2.27	0.81			
DLS	Boy	268	1.94	0.93	-0.270	-3.313	**.001***
	Girl	242	2.21	0.90			
MVK	Boy	268	1.93	0.91	-0.245	-3.008	**.003***
	Girl	242	2.18	0.92			
MTK	Boy	268	2.08	0.85	-0.232	-3.126	**.002***
	Girl	242	2.31	0.82			
DPS	Boy	268	1.94	0.88	-0.292	-3.752	**.001***
	Girl	242	2.23	0.87			

Note: DUOT: Thoughts about Use of Technology, DLS: Thoughts about Learning Styles,
DMVK: Thoughts about Multimedia, Visual and Kinematics,
DMTK: Thoughts about Multitasking, DPS: Thoughts about Playing Styles.

From the independent *t*-test result as shown in Table 5.8, there existed significant difference ($p<0.05$) between all scales in gender. But on the other hand, looking at the results, the high mean for each dimension is from the girls, however MTK gave the highest responses with mean values of M = 2.31, SD = 0.82, UOT: M = 2.27, SD = 0.81; PS: M = 2.23, SD = 0.87 and MVK: M = 1.93, SD = 0.91 . While low mean from each dimension is from the boys, which MVK gave the lowest responses with mean values of M = 1.93, SD = 0.91, LS: M = 1.94, SD = 0.93, PS: M= 1.94, SD = 0.87.

There existed a significant difference in gender, where the girls gave highest mean value in Multitasking and Use of Technology (UOT). The result was due to high level of interest in modern technology for learning purposes than boys. Similar result was found by Kirmani et al. (2009) which suggested that environmental factors are state to contribute towards

gender differences. These factors influence how children respond to technology. Children's social alignment (their exposure to gender-specific roles, expectations, and attitudes), and the role of media and educational materials, both affect young children's access and use of computers. Also, Kay (2007) stated that boy's use computer more frequently than girls but girls appears to use computer for goal oriented activities and meaningful context. It also stated that girls prefer co-operative learning. Though, Downey, Hayes and O'Neill (2007) stated that Mobile phones appear to be highly needed devices as a child gets older. Girls incline to dominate this area slightly at the tender age and most children said that their main use was to text friends and play games.

5.4.3 Digital Characteristics Based on School Differences

In order to figure the opinions of the children' acumen in the digital learning characteristics and the use of technologies between types of school which one-way ANOVA was employed. According to the Table 5.9 and 5.10 concerning the opinions of the children' perception in the digital learning characteristics and the use of technologies there are statistically significant differences between school types in this study ($p<.05$). In all school types category private school urban had the highest total mean values and it is significantly difference from every other school types in all dimensions.

Table 5.9: Difference between schools

Dimensions	Type Of Schools	N	Mean	SD	Mean Square	F	P
UOT	Government School Rural	195	1.8731	.62278	36.679	77.432	**.000***
	Private School Rural	50	1.8632	.90163			
	Government School Urban	127	1.8363	.90362			
	Private School Urban	138	2.9043	.39826			
	Total	510	2.1420	.82891			
LS	Government School Rural	195	1.7077	.81123			
	Private School Rural	50	1.9467	.95086			

	Government School Urban	127	1.7612	.93708	45.330	75.378	**.000***
	Private School Urban	138	2.9106	.39776			
	Total	510	2.0699	.93005			
MVK	Government School Rural	195	1.6679	.79199			
	Private School Rural	50	1.9250	.95865			
	Government School Urban	127	1.7795	.92561	46.529	78.888	**.000***
	Private School Urban	138	2.9058	.41658			
	Total	510	2.0559	.92767			
MTK	Government School Rural	195	1.9436	.70484			
	Private School Rural	50	1.9450	.94934			
	Government School Urban	127	1.9035	.91290	32.463	61.636	**.000***
	Private School Urban	138	2.9130	.39111			
	Total	510	2.1961	.84553			
PS	Government School Rural	195	1.7251	.71705			
	Private School Rural	50	1.9200	.95959			
	Government School Urban	127	1.8110	.92077	43.259	79.858	**.000***
	Private School Urban	138	2.9087	.40444			
	Total	510	2.0859	.89077			

Note: DUOT: Thoughts about Use of Technology, DLS: Thoughts about Learning Styles,
DMVK: Thoughts about Multimedia, Visual and Kinematics.
DMTK: Thoughts about Multitasking, DPS: Thoughts about Playing Styles.

From the one-way ANOVA result as shown in Table 5.9, there existed significant difference ($p<0.05$) between UOT, LS, MVK, MTK and PS in types of schools. Children in the private schools urban had higher means values in UOT, LS, MVK, MTK and PS than government school rural, government school urban and private school rural. This result suggests that children that attend private schools in urban area had more access to the use of technologies and also exhibit the characteristics of the digital child that children in other types of schools. This might be due the good quality of technical education that the children received in school and good finical background to support their digital learning devices needed than other schools. From the result reported in Table 5.9, it was observed

that there is type of school difference based on UOT, LS, MTK, MVK and PS, which private school gave a highest mean average of (M = 2.9) this suggest that privates school in Nigeria can be classified among to be called digital children under digital Natives.

According to Adefunke, Ayodele and Olufemi (2014) showed that there existed a significant difference in the availability of computer hardware and software in government and private schools. The findings stated that private schools were highly equipped with ICT facilities, modern learning material than public schools. Ogunjinmi et al. (2014) revealed that access to ICT between government's primary and private schools varies. Based on its finding, pupils in private primary schools had more access to ICT tools with (64%) computer and local TV, (40%) video animation having wild animals, (37.8%) video on wildlife, (13.3%) internet games and digital TV. While public primary schools lack access to computer and local TV, video animation having wild animals, video on wildlife, internet games and digital TV. Similarly, Asodike and Jaja (2012) discovered that ICT facilities are higher in private primary schools than their government counterpart in Rivers state of Nigeria. Akinyetun (2009) expressed that pupils in the private schools exhibit higher academic performance than pupils in the public school, stating because most public schools teachers and pupils lack ICT skills and also adequate ICT tools in their schools and homes. Osunwusi and Abifarin (2013) found that private school pupils are more engaged in computer literacy and also have higher access to and use of computer than public school pupils. Therefore the result on Table 5.9 which showed private school urban with the highest mean is supported.

Table 5.10 shows the multiple comparisons of all types of schools. This compares the age group in each section within each group between the types of the schools:

Under (UOT, LS, MVK, MTK and PS), there is significant difference between government schools rural with private school urban but there is no significant difference between government school rural with private school rural and government school urban.

There is significant difference between private schools rural with private school urban but there is no significant difference between private school rural with government school rural and government school urban. There is significant difference between government schools urban with private school urban but there is no significant difference between government school urban with government school rural and private school rural.

There existed significant difference between private schools urban with all other types of schools.

Table 5.10: Multiple comparison difference based on types of schools

Dependent Variable	(I) school	(J) school	Mean Difference (I-J)	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
	Government school in rural	Private School Rural	.00999	.13508	-.3483	.3682
		Government School Urban	.03684	.09175	-.2018	.2755
		Private School Urban	**-1.03113***	.05602	-1.1765	-.8858
	Private school in rural	Government School Rural	-.00999	.13508	-.3682	.3483
		Government School Urban	.02685	.15063	-.3713	.4251
		Private School Urban	**-1.04111***	.13194	-1.3915	-.6907
	Government in school urban	Government School Rural	-.03684	.09175	-.2755	.2018
		Private School Rural	-.02685	.15063	-.4251	.3713

		Private School Urban	**-1.06797***	.08706	-1.2946	-.8413
	Private school in urban	Government School Rural	**1.03113***	.05602	.8858	1.1765
		Private School Rural	**1.04111***	.13194	.6907	1.3915
		Government School Urban	**1.06797***	.08706	.8413	1.2946
LS	Government school in rural	Private School Rural	-.23897	.14648	-.6270	.1490
		Government School Urban	-.05346	.10144	-.3172	.2102
		Private School Urban	**-1.20294***	.06724	-1.3773	-1.0285
	Private school in rural	Government School Rural	.23897	.14648	-.1490	.6270
		Government School Urban	.18551	.15810	-.2325	.6035
		Private School Urban	**-.96396***	.13867	-1.3323	-.5957
	Government school urban	Government School Rural	.05346	.10144	-.2102	.3172
		Private School Rural	-.18551	.15810	-.6035	.2325
		Private School Urban	**-1.14947***	.08978	-1.3832	-.9157
	Private school in urban	Government School Rural	**1.20294***	.06724	1.0285	1.3773
		Private School Rural	**.96396***	.13867	.5957	1.3323
		Government School Urban	**1.14947***	.08978	.9157	1.3832
MVK	Government school in rural	Private School Rural	-.25705	.14696	-.6464	.1323
		Government School Urban	-.11158	.09981	-.3711	.1479
		Private School Urban	**-1.23785***	.06689	-1.4114	-1.0643
	Private school in rural	Government School Rural	.25705	.14696	-.1323	.6464

		Government School Urban	.14547	.15851	-.2737	.5647
		Private School Urban	**-.98080***	.14013	-1.3530	-.6086
	Government school in urban	Government School Rural	.11158	.09981	-.1479	.3711
		Private School Rural	-.14547	.15851	-.5647	.2737
		Private School Urban	**-1.12627***	.08946	-1.3592	-.8934
	Private school in urban	Government School Rural	**1.23785***	.06689	1.0643	1.4114
		Private School Rural	**.98080***	.14013	.6086	1.3530
		Government School Urban	**1.12627***	.08946	.8934	1.3592
	Government school in rural	Private School Rural	-.00141	.14343	-.3817	.3788
		Government School Urban	.04005	.09545	-.2081	.2882
		Private School Urban	**-.96945***	.06047	-1.1263	-.8126
	Private school in rural	Government School Rural	.00141	.14343	-.3788	.3817
		Government School Urban	.04146	.15680	-.3732	.4561
		Private School Urban	**-.96804***	.13832	-1.3354	-.6006
MTK	Government school in urban	Government School Rural	-.04005	.09545	-.2882	.2081
		Private School Rural	-.04146	.15680	-.4561	.3732
		Private School Urban	**-1.00950***	.08758	-1.2375	-.7815
	Private school in urban	Government School Rural	**.96945***	.06047	.8126	1.1263
		Private School Rural	**.96804***	.13832	.6006	1.3354
		Government School Urban	**1.00950***	.08758	.7815	1.2375

PS	Government School in rural	Private School Rural	-.19487	.14510	-.5795	.1898
		Government School Urban	-.08590	.09650	-.3368	.1650
		Private School Urban	**-1.18357***	.06182	-1.3440	-1.0232
	Private school in rural	Government School Rural	.19487	.14510	-.1898	.5795
		Government School Urban	.10898	.15840	-.3099	.5279
		Private School Urban	**-.98870***	.14001	-1.3605	-.6169
	Government school in urban	Government School Rural	.08590	.09650	-.1650	.3368
		Private School Rural	-.10898	.15840	-.5279	.3099
		Private School Urban	**-1.09767***	.08866	-1.3285	-.8669
	Private school in Urban	Government School Rural	**1.18357***	.06182	1.0232	1.3440
		Private school Rural	**.98870***	.14001	.6169	1.3605
		Government School Urban	**1.09767***	.08866	.8669	1.3285

*. The mean difference is significant at the 0.05 level.

5.4.4 Digital Child Characteristics Based on Location Differences

In order to comprehend the opinions of the children acumen in the digital learning characteristics and the use of technologies between both locations, independent samples *t*-test was employed. According to the Table 5.11, concerning the opinions of the children' perception in the digital learning characteristics and the use of technologies, there are statistically significant differences between location in this study ($p<.05$).

Table 5.11: Difference between Areas

Dimensions	Location	N	Mean	SD	Mean Difference	t	p
UOT	Rural	245	2.03	0.70	-0.204	-2.799	**.005***
	Urban	265	2.24	0.92			
LS	Rural	245	1.92	0.88	-0.278	-3.415	**.001***
	Urban	265	2.20	0.95			
MVK	Rural	245	1.89	0.87	-0.311	-3.843	**.001***
	Urban	265	2.20	0.94			
MTK	Rural	245	2.11	0.75	-0.157	-2.108	**.036***
	Urban	265	2.27	0.91			
PS	Rural	245	1.93	0.81	-0.284	-3.649	**.001***
	Urban	265	2.22	0.93			

Note: DUOT: Thoughts about Use of Technology, DLS: Thoughts about Different Learning Styles
DMVK: Thoughts about Multimedia, Visual and Kinematics,
DMTK: Thoughts about Multitasking, DPS: Thoughts about Playing Styles.

From the independent *t*-test result as shown in Table 5.11, there existed significant difference ($p<0.05$) between all dimension between rural and urban areas. However looking at the results, MTK gave the highest best responses with mean values of M = 2.27, SD = 0.91; UOT: M = 2.24, SD = 0.92 for the urban. While MVK gave the lowest responses with mean values of M = 1.89, SD = 0.87; LS: M = 1.92, SD = 0.88; PS M = 1.93, SD = 0.81 for rural areas.

There is a significant difference between school located on the urban and rural regarding ICT knowledge which showed that children in the urban school have higher access to technology than the rural schools. Based on the study from Osuafor and Osisioma (2014) stated that student from urban schools have significantly higher ICT knowledge than their counterpart from the rural area. It also elaborated that out of a sample of 540 student 32% of urban respondents shows that ICT devices are available and accessible, while 13.5% of rural showed ICT available and accessible. According to Uwadia (2003) expressed that there is a disparity towards ICT accessibility between rural and urban area. Furthermore, Non availability and usability of ICT facilities among urban and rural schools is in line with Ndirika and Kanu (2012) findings that on the average, 58.0% and 39.9 responded non-availability of ICT facilities in the rural and urban schools respectively. It also

expressed that internet and computer facilities were not sufficiently provided in schools for studies, however a lot of teacher did not use them as teaching materials.

Olamiju and Olujimi (2011) based on the study conducted in Akure Ondo state of Nigeria, found out that many school in the remote rural area do not get educational facilities from the government and teacher prefer the urban schools for employment due to lack of adequate education facilities in the rural areas. Previous research conducted by Wang, Lin and Mao (2003) to measure the skills and information literacy at Beijing Normal University. Results found that students who came from the rural area were not exposed to computers during their time and possess little skillful data literacy, Perhaps result based on Table 5.8 is supported with the previous research.

Generally, Gbenga-Ilori and Ibiyemi (2010) emphasized that rural area in Nigeria suffer a lot from marginalization in the area of ICT establishment. With regards to the low access of ICT, student in the rural area will keep on struggling with the rapid current global technology development and information. Davidson et al. (2013) stated that non access to internet in the rural area test to be Digital Divided.

CHAPTER 6

CONCLUSIONS AND RECOMMENDATIONS

This chapter highlights the conclusions and recommendations of the study.

6.1 Conclusions

The result carried out in this study indicates that there is an average response of children in the use of technology (UOT). The study suggests that the reason for that might be due to poor or no ICT facilities in the schools and at home. Most of the children in the rural area and do attend government school indicate to have shown low access to internet and use of ICT. In a glance one can easily say that the education system have not integrate Technology education learning system effectively, hereby making the children to be vulnerable of being digitally divided.

It was also found that the digital characteristics of the children in the entire dimension (LS, MVK, MTK and PS) are little above average. Multitasking having high responses indicates that the children of the digital natives exhibit more multitasking during daily activities. While multimedia show a low response, it indicates that the learning system does not encompass learning via pictures sound and video which can really help the child during the early development. Modern learning system using multimedia will yield more benefits than the old traditional methods. There is need to call for the government and policy-makers to redesign or reform the Universal basic Education to integrate and implement the use of multimedia and other digital learning tools into learning activities.

The study also show a significant difference between age group, which implies that increase in age also have relation towards increase in technologies usage. However the more increase in age, more likely exposure in use of technology among children. Therefore each specific multimedia learning tools has to be used in order to impact positively to the learning system. There is significant difference between genders; this result shows that the girls have high responses than the boys. This implies that girls are more expose to technology social alignment and suggest that girls are benefiting more among the digital natives which is opposite to other researcher.

It is an important result that digital characteristics based on school differences have shown statistically significant opinion of each school. Though, the private schools in the urban have shown having the highest response rate in use of technology and digital characteristics. In view of the result one can say that the private schools have good technical education, adequate learning facilities and high learning standard than the government schools. This result should always been considered by the government and policy-makers to create a balanced learning environment among the digital native.

Another result shown in this study indicates significant difference between urban and rural area. This aspect has drawn more concern in the educational system of some developing nations such as Nigeria. Based on the results, schools in the urban area have higher response than there counterpart in the rural area. This implies that the education system and socioeconomic development has created segregation between the schools in urban and rural area. Therefore the government should resign the deployment of well-trained teachers and the distribution of modern learning facilities in balance ratio to the urban and rural areas.

Finally, this study will assist software developers in the department of computer information system to understand and put into consideration these major digital characteristics when designing interactive e-learning system, apps or games for children.

6.2. Recommendations

Quality education is the key to national development, but for this quality education to be more effective and reliable; the federal government has to integrate adequate source of power supply and modern technology into teaching and learning method. The primary education level in Nigeria is lacking so tremendously regarding use of ICT facilities for teaching and learning, however the integration of ICT and accessible education will lift many of the citizens that were living below the poverty line. The ministry of education and ministry of information and communication should put all hand on desk to execute important projects such as re-training of teacher for effect use of ICT tools, building and maintaining ICT infrastructures, expanding ICT projects to schools in the rural areas.

The ministry of education should revise the primary education teaching curriculum and learning materials to adequate international standard. The learning environment should be digital conducive for teaching and learning.

Techers and educator have to adapt to the modern technology teaching and learning trends, such as the use of iPad, projectors, multimedia devices rather than the old teaching method. The key of Quality education rely in technology; therefore the government should integrate adequate use of technology in the primary education learners.

Further research directions might be conducted on the digital learning preference of digital Natives in Nigeria. Basically most of the characteristics identified in the other research conducted in developed countries cannot be used to compare towards children in Nigeria.

There should be research towards proposing a theoretical framework that will have to use towards characterising the Digital Natives or Net Generation in any country.

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APPENDICES

APPENDIX 1

SCHOOL ASSENT FORM ON

(BEHALF OF THE CHILDREN BETWEEN 9-12 yrs. old)

Dear Parent / Guardian,

My name is Eluwa Magnus Ezeudo, a master Student in the Faculty of Economics and Administrative sciences, Department of Computer Information Systems at Near East University. I am conducting a thesis research study to explore how children use, seek, share Information technology. This aim to identify the main characteristic's that children possess while interacting with technology in everyday lives. I am inviting your child to participate in the study, because I was impressed to understand that today's children have a different learning and playing styles, which can assist educators to learn more about the experience of today's digital natives and assist them in revising the standard of learning.

WHAT THE STUDENT WILL DO:

Your child (boy and girl between the age ranges of **9-12**) will be asked to complete a questionnaire that asks about their experience about technology, which the teacher will guide them to complete. A group interview may be conducted and, I will record the reactions towards it.

BENEFITS: Because your child participation is valuable, I will offer a refreshment to thank you for your willingness and availability for him/her to participate. The study results will contribute to informing educators, children policy makers, researchers and information professionals to a better help of today's children. The participation in this study is completely voluntary and there is no penalty or disadvantage if you decide that your child will not participate.

PRIVACY AND POTENTIAL RISKS: Your child privacy is very important to me; therefore, I am not going to reveal any individually identifiable data, such as your name or contact information to anyone. I know of no risks when you participate in the research.

QUESTIONS/COMMENTS? If you have any questions, feel free to contact me, Eluwa Magnus (Email: magnusezeudo@yahoo.com, mobile No: +905338843442). I am conducting the study under the direction of **Assoc.Prof.Dr. Nadire CAVUS,** and you may want to talk to her (Email: nadire.cavus@neu.edu.tr .If you have any questions/concerns regarding the study and would like to talk to someone other than the researcher, you are encouraged to contact the Near East University. Thank you very much. I look forward to meeting you soon! Best wishes,

Eluwa Magnus Ezeudo
(Master Student)

Assoc.Prof.Dr. Nadire CAVUS
Deputy Director, Graduate School of Applied Sciences
Chairperson, Department of Computer Information Systems
Faculty of Economics & Administrative Sciences
Near East University, CYPRUS
Via: Mersin 10 Turkey
Tel.: +90 392 675 10 00 (3114), Fax: +90 392 675 10 51

I parent/Guardian of .....read the parent/Guardian form and agree with my child participation with the study, by signing below.

Signature: **Date:**

APPENDIX 2

PARENTS/GUARDIAN CONSENT FORM

Dear Sir / Ma,

My name is Eluwa Magnus Ezeudo, a master Student in the Faculty of Economics and Administrative sciences, Department of Computer Information Systems at Near East University in Cyprus. I am conducting a thesis research study to explore how children use, seek, share Information Technology. This aim to identify the main characteristic's that children possess while interacting with technology in everyday lives. I am inviting your school to participate in the study, because I was impressed to understand that today's children have a different learning and playing styles, which can assist educators to learn more about the experience of today's digital natives and assist them in revising the standard of learning.

WHAT THE STUDENT WILL DO:

All the students (boys and girls at **balanced ratio)** between the age ranges of **9-12** will be asked to complete a questionnaire that asks about their experience about technology, which the teacher will guide them to complete. A group interview may be conducted and, I will record the reactions towards it.

BENEFITS: Because your student's participation is valuable, I will offer a refreshment to thank you for your willingness and availability to participate. The study results will contribute to informing educators, children policy makers, researchers and information professionals to a better help of today's children. The participation in this study is completely voluntary and there is no penalty or disadvantage if you decide not to do it.

PRIVACY AND POTENTIAL RISKS: Your privacy is very important to me; therefore, I am not going to reveal any individually identifiable data, such as your name or contact information to anyone. I know of no risks when you participate in the research.

QUESTIONS/COMMENTS? If you have any questions, feel free to contact me, Eluwa Magnus (Email: magnusezeudo@yahoo.com, mobile No: +905338843442). I am conducting the study under the direction of **Assoc.Prof.Dr. Nadire CAVUS,** and you may want to talk to her (Email: nadire.cavus@neu.edu.tr .If you have any questions/concerns regarding the study and would like to talk to someone other than the researcher, you are encouraged to contact the Near East University. Thank you very much. I look forward to meeting you soon! Best wishes,

Eluwa Magnus Ezeudo
(Master Student)

Assoc.Prof.Dr. Nadire CAVUS
Deputy Director, Graduate School of Applied Sciences
Chairperson, Department of Computer Information Systems
Faculty of Economics & Administrative Sciences
Near East University, CYPRUS
Via: Mersin 10 Turkey
Tel.: +90 392 675 10 00 (3114), Fax: +90 392 675 10 51

By signing below, I agree with participating in the study.

Signature **Date**

APPENDIX 3

RESEARCH QUESTIONNAIRE: USE OF TECHNOLOGY AMONG DIGITAL CHILD IN THE 21st CENTURY

This is an academic research to determine the Characteristics of Digital Child. The questionnaire will be anonymous and the result of the questionnaire will be used for academic purpose only. It may take you no more than 10 minutes to complete.

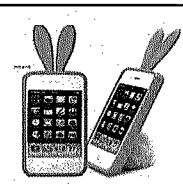
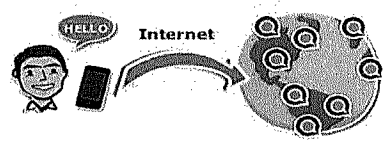
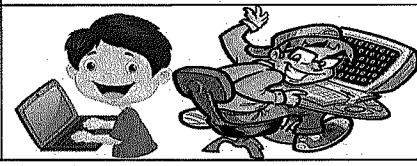
Thanks for your patience and cooperation.

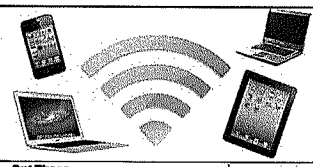
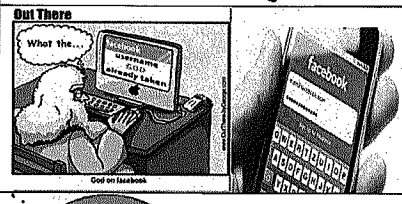
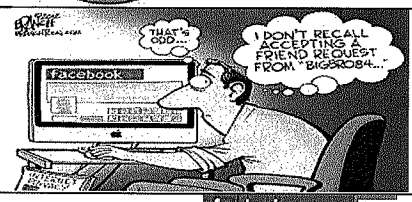
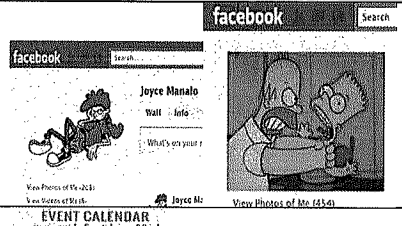
Assoc.Prof.Dr. Nadire Çavuş
Eluwa Magnus (Master Student)
Near East University

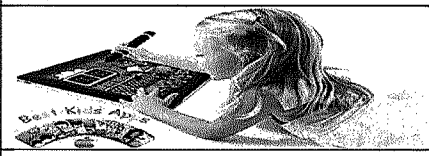
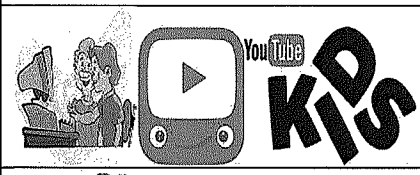
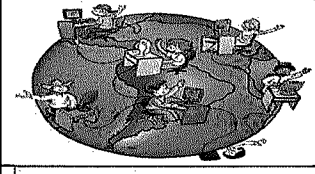
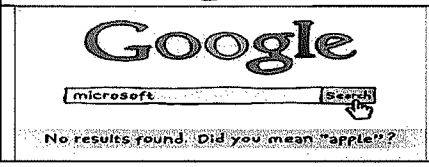
SECTION A: Personal Information

1. **Age:** 9☐ 10☐ 11☐ 12☐
2. **Gender:** ☐ Boy ☐ Girl
3. **School:** ☐ Government ☐ Private
4. **Location:** ☐ Rural Area ☐ Urban Area
5. **Nationality:** ☐ Nigerian

For each items below <u>TICK</u> the response that best characterize how you feel about the items.

1. I have a mobile device.	 	Yes☐	No☐	Sometimes☐
2. My mobile device have access to the internet.		Yes☐	No☐	Sometimes☐
3. I have a computer or laptop at home.		Yes☐	No☐	Sometimes☐

4. My computer or laptop have Internet access.		Yes☐	No☐	Sometimes☐
5. I have a Facebook account.		Yes☐	No☐	Sometimes☐
6. I increased my age, so that I can open a Facebook account.		Yes☐	No☐	Sometimes☐
7. I use Facebook to communicate with my friends, instead of face to face.		Yes☐	No☐	Sometimes☐
8. I use my sibling (sisters and brothers)Facebook account.		Yes☐	No☐	Sometimes☐
9. I can use calendar in my mobile phone.		Yes☐	No☐	Sometimes☐
10. I can use alarm clock in my mobile device.		Yes☐	No☐	Sometimes☐
11. I can send message (SMS, MMS etc.) to my friend with my mobile device.		Yes☐	No☐	Sometimes☐
12. I can play games with my mobile device.		Yes☐	No☐	Sometimes☐
13. I can play games with my laptop or computer.		Yes☐	No☐	Sometimes☐

14. I go to the internet café to play games of watch movies.		Yes☐	No☐	Sometimes☐
15. I like using mobile device for learning.		Yes☐	No☐	Sometimes☐
16. I enjoy watching television program that helps me to learn.		Yes☐	No☐	Sometimes☐
17. I use "YOUTUBE" to listen to music, watch film or cartoon movies.		Yes☐	No☐	Sometimes☐
18. I have heard about the word "INTERNET".		Yes☐	No☐	Sometimes☐
19. I have heard about the word "GOOGLE".		Yes☐	No☐	Sometimes☐

PLEASE ENSURE TO CROSS-CHECK AND TICK ONE REPONSE FOR EACH ITEM.

THANK YOU 

APPENDIX 4

RESEARCH QUESTIONNAIRE: THE DIGITAL CHARACTERISTICS OF DIGITAL CHILD IN THE 21ST CENTURY

For each items below TICK the response that best characterize how you feel about the items.

LEARNING STYLE			
1. I prefer learning with picture than text.	Yes☐	No☐	Sometimes☐
2. I prefer doing practical activities when learning.	Yes☐	No☐	Sometimes☐
3. I prefer watching slides than text reading during learning process.	Yes☐	No☐	Sometimes☐
MULTIMEDIA, VISUAL AND THAN TEXT			
4. I easily remember anything I see.	Yes☐	No☐	Sometimes☐
5. I prefer pictures and sounds objects.	Yes☐	No☐	Sometimes☐
6. Picture, sound and video helps me to understand better than text.	Yes☐	No☐	Sometimes☐
7. Physical education increases my learning ability.	Yes☐	No☐	Sometimes☐
MULTITASKING			
9. I do several tasks with technology device at same time.	Yes☐	No☐	Sometimes☐
10. I enjoy playing games at same time reading or studying.	Yes☐	No☐	Sometimes☐
11. I like to get quick feedback from mobile device interaction.	Yes☐	No☐	Sometimes☐
PLAYING STYLE			
12. I prefer playing with mobile device or digital toy than watching Television.	Yes☐	No☐	Sometimes☐

13. I do have a digital toy.	Yes☐	No☐	Sometimes☐
14. I love playing with digital educational toy that helps me to learn.	Yes☐	No☐	Sometimes☐
15. I prefer playing with my friends than playing alone.	Yes☐	No☐	Sometimes☐
16. I enjoy playing online games.	Yes☐	No☐	Sometimes☐

PLEASE ENSURE TO CROSS-CHECK AND TICK ONE REPONSE FOR EACH ITEM.

THANK YOU