INTEL 1:1 E-LEARNING IN NIGERIA

White Paper on the Intel-powered Classmate PC Project in Nigeria

(2007 – 2009)

Table of Contents

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

The digital divide in Nigeria is gradually being bridged through a special initiative initiated by Intel Corporation in Nigeria in 2006 involving the use of its 1:1 computing e-learning model in selected schools in Nigeria.

The project which started with a proof-of-concept (PoC) of just 36 selected students at the Government Junior Secondary school (JSS) Jabi in Abuja, Nigeria has spread to over a thousand schools and is currently benefiting over twenty thousand students.

For the PoC, Intel provided the 36 selected students with Intel-powered classmate PCs running on windows XP, training for teachers on the Intel Teach programme, two Teacher laptops for use in classes with an interactive whiteboard, broadband internet access, curriculum based digital content from the Intel Skoools program and a repository for viewing content offline. The PoC ran for three months after which a post-implementation review revealed that the selected students showed a 30% improvement in their academic performance when measured against previous performance. This remarkable improvement in academic performance ignited a whole new era in ICT enabled programmes for education and institutionalized the 1:1 computing model as the way forward for many Nigerian schools.

The PoC showed Nigerian educators the value of 1:1 e-learning for young children and provided practical lessons to guide future efforts. The project as a whole highlights the importance of comprehensive approaches that combine child-friendly mobile learning devices with wireless Internet access, locally relevant content and teachers who are skilled at using technology to enhance teaching and learning.

The first of its kind in Africa, the project is part of Intel's World Ahead programme aimed at bringing technology to people around the world and enjoys support from the Federal Government of Nigeria's Education Trust Fund (ETF), the Universal Service Provision Fund (USPF), education service providers such as Zinox Technologies, EDtek Learning Services, Chips, Bites & Bytes, TSC and other contributors across the country.

Three years after it kicked-off, the project has grown with Intel's guidance and support to a full blown 1:1 computing model for Nigeria serving as a standard for public and private schools in Nigeria and West-Africa. The initial effort has so far been replicated in over 1000 Public School and 760 Private schools across the Country by different teams using variations to the original model.

This paper highlights the learning from the pilot and subsequent deployments, the impact of the different adoption models used by the schools and the potential for revolutionizing the way of learning in Nigerian schools.

INTEL-POWERED Classmate PC PROJECT

As part of the Intel World Ahead Program, Intel aims to transform and improve education worldwide by providing individual, complete, and uncompromised education solutions that meet the particular needs of people and governments in the world's developing countries.

While the Intel-powered classmate PCs are designed for students in emerging market, Intel also understands and addresses the particular needs, goals, and aspirations of each and every player of education systems worldwide – namely, children, teachers, parents, and policy makers.

Intel-powered classmate PCs are small, mobile education-oriented PC to be used in classrooms in around the world. The fully-functional PC is designed to provide affordable, collaborative learning environments for K-12 students and their teachers.

These purpose built notebooks were designed to specifically meet the educational needs of young students and create new possibilities. They are based on reliable Intel mobile processors and feature enough memory and storage to run real-world applications.

The Challenges of E-Learning

Information and Communication Technologies (ICT) have become key tools that are having a revolutionary impact on how we see the world and how we live. This phenomenon has given birth to the contemporary e-commerce, e-government, e-medicine and e-learning.

ICTs are having a revolutionary impact on educational methodology globally. However, this revolution is not widespread and needs to be strengthened to reach a large percentage of the population.

Although ICTs hold great potential for supporting and augmenting existing educational as well as national development efforts, they pose particular challenges to Nigeria specifically. Some of these peculiar challenges include:

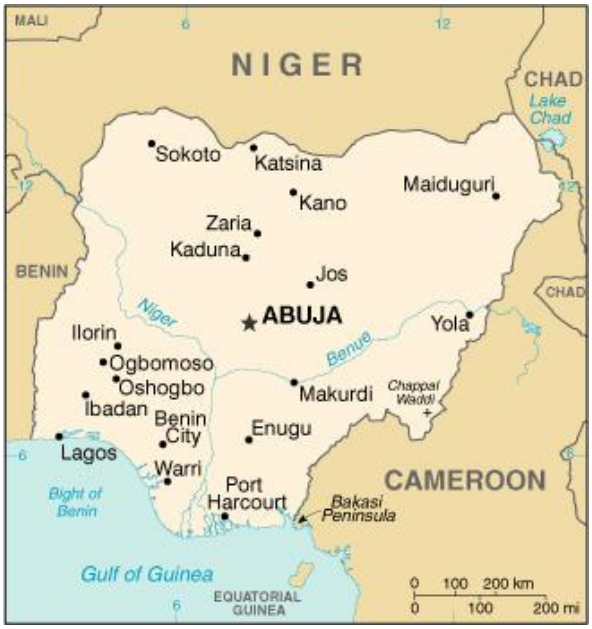
1. Inadequate ICT infrastructure including high cost of bandwidth access;
2. Lack of skilled manpower, to manage available systems and inadequate training facilities for ICT education at the tertiary level;
3. Resistance to change from traditional pedagogical methods to more innovative, technology based teaching and learning methods, by both students and academic staff;
4. The overall educational system is underfunded, therefore, available funds are used to solve more seemingly urgent and basic survival needs by the institutions;
5. The over-dependence of educational institutions on government has limited these institutions ability to collaborate with the private sector or seek alternative funding sources for ICT educational initiatives.
6. Ineffective coordination of the various ICT for education initiatives mushrooming across the countries educational institutions.

The 1:1 e-learning opportunity presented by the Intel-powered Classmate project has been described as a pragmatic step towards surmounting some of these challenges.

In an effective 1:1 eLearning environment, technology tools and connectivity are deeply integrated into the classroom experience, rather than confined in a PC lab or limited to a few PCs at the back of the classroom.

The computer moves with the student instead of the student moving to the computer, while the focus is on learning using computers rather than learning about computers.

NIGERIA COUNTRY PROFILE



Nigeria (pronounced /naɪˈdʒɪrɪə/), officially the Federal Republic of Nigeria, is a federal constitutional republic comprising thirty-six states and one Federal Capital Territory.

It is Africa's most populous country and composed of more than 250 ethnic groups.

The country is located in West Africa and shares land borders with the Republic of Benin in the west, Chad and Cameroon in the east, and Niger in the north.

Its coast lies on the Gulf of Guinea, a part of the Atlantic Ocean, in the south. The capital city is Abuja.

Table 1: Nigeria Socio-economic Indicators

Indicator	Value
Population	140 Million
GDP (US Dollars)	393
Phone subscribers per 100 inhabitants	14.5
Computers	860,000
Internet hosts	1,094
Internet Users	750,000
Radio house holds	15.3 million
TV house holds	6.3 million

World Development Indicators 2007, April 2007, The World Bank.

Nigeria's Education System

The Federal Ministry of Education coordinates planning, policy and finance for the education sector under the federal Government.

Nigeria operates a 6-3-3-4 system of education with nine years of compulsory basic education comprising the primary school and junior secondary school (JSS) levels; this is followed by three years of senior secondary school (SSS) and four years of university education.

Table 2: Gross Enrolment Ratio (%)* 1995-2004

	1995	2000	2004
Primary	93.3	95.5	99.2
Secondary	32.0	24.2	34.6
Tertiary	4.3	6.6	10.2

*Number enrolled as a percentage of total number in the eligible age group.

As at 2004, the ratio of pupils to teachers at the elementary level was 50.3 to 1. Overall literacy rate was 68%, with the female rate at 59%.

Nigerian ICT Policy

The first national ICT policy for Nigeria was issued in 2001. The general objectives of the policy were to:

- Ensure that Information Technology resources are readily available to promote efficient national development;
- Guarantee that the country benefits maximally and contributes meaningfully by providing the global solutions to the challenges of the Information Age;
- Empower Nigerians to participate in software and IT development;
- Encourage local production and manufacture of IT components in a competitive manner;
- Improve accessibility to public administration for all citizens;
- Bring transparency to government processes;
- Establish and develop IT infrastructure and maximize its use nationwide;
- Improve judicial procedures and enhance the dispensation of justice

In 2007, the National Information Technology Development Agency Act established the National Information Technology Development Agency (NITDA), the National Information Technology Development Fund (NITDF) and provides for the President or the supervising Minister to designate and facilitate the establishment of Information Technology Parks. The Act empowers NITDA to plan, develop and promote the use of information technology in Nigeria. The National Information Technology Development Fund constitutes the main intended source of funding for NITDA programmes.

Vision 20-20-20

The economic blueprint aimed at placing Nigeria among the biggest 20 economies in the world by 2020 is called the Vision 20:2020. It is widely acknowledged that for this vision to be achieved, education will play a key role and ICT equally so.

ICT in Nigeria's Vision 20-20-20

Vision Statement

Attain an Information and knowledge-based economy and society that is efficient and technology-enabled through a globally competitive ICT Industry.

Objectives

1. **To make ICT an enabler to transform the socio-economic sectors of Nigeria.**
2. **To deploy ICT in Government to improve the efficiency and effectiveness of service delivery.**
3. **To attain globally competitive local capacity with regards to human capacity in all aspects of ICT.**
4. **To attain competitive local capacity in ICT infrastructure.**
5. **To develop the ICT Industry for the production of Software & Hardware global Standards.**
6. **To Pursue Research and Development (R&D) activities and encourage innovation in ICT.**

***Source:** Report of the NV 20:2020 National Technical Working Group on ICT*

Phase 1: Junior Secondary School (JSS) Jabi

Phase 1 of the project began in 2007 when Intel working with the Nigerian Government initially created a 1:1 e-learning environment as a proof of concept (PoC) for just 36 second year students and their teachers at the Government Junior Secondary School in Jabi, a town in the outskirts of the Nigeria capital city of Abuja. For the PoC

- A Classroom was renovated to accommodate the new technology.
- Each student was given access to an Intel-powered classmate PC donated by Intel through the ICT for Education program.
- The classroom was also outfitted with a SMART interactive whiteboard and SynchronEyes classroom management software from SMART Technologies.
- A high-speed wireless network using WiMAX technology was established.
- Teachers received training from the Intel® Teach- Essentials Program, as well as ongoing support in curriculum development and methods for using technology to enhance teaching and learning.
- Teachers were given access interactive, multimedia content from Intel's Skoool.ng, Nigeria's Ministry of Education and local software developers.

The PoC ran for three months after which a review revealed that the selected students showed a 30% improvement in their academic performance when measured against previous performance. The end-of-term exams showed the PoC class scoring higher than two comparable classes in all areas of the curriculum. Scores in computer science and introductory technology were significantly higher. The PoC students also scored higher in mathematics and English, and significantly higher in integrated science, social studies, and physical/health education.

This resounding success of the 36 student PoC, led to the subsequent deployment of additional computers for a Pilot project that brought the total number of classmate PCs deployed to JSS Jabi to over 200.

While students used the fully-functional classmate PCs, teachers needed more powerful mobile computers to help them develop lesson plans, research curriculum resources, manage their classroom activities with the students and collaborate with colleagues. Each teacher in the program therefore received an Intel® Core™2 Duo-based laptop that they used for developing lessons, managing teaching sessions and accessing information.

Suburban Broadband installed a WiMAX network in the classroom and the surrounding area giving Internet connectivity to students and teachers to access a world of resources, including educational tools and applications.

Teachers, students and even parents were also given access to Intel's Skoool Nigeria.com- an interactive suite of rich digital education content which aims to advance education by delivering the benefits of high quality multimedia technology content and online encyclopedia.

Skoool Nigeria is an Intel® driven initiative that brings highly innovative, interactive and exciting learning resources via cutting edge technologies and devices. It is the first resource of its kind designed specifically to provide learners and teachers with all they need to support their understanding of subjects.

The Skoool content, built in line with the Nigerian curriculum, provides digital content for teaching and learning of basic Mathematics and science, provided over the internet, intranet and multimedia CDs for Nigerian schools.

skoool Nigeria is part of Intel's World Ahead Programme, which aims to enhance lives by accelerating access to uncompromised technology for everyone, anywhere in the world. Focused on people in the world's developing communities, it integrates and extends Intel's efforts to advance progress in four areas: accessibility, connectivity, education and content.

Teachers from the school received training under the Intel® Teach programme which was created for teachers, by teachers, to help them effectively integrate technology into the classroom to enhance student learning. It is designed to improve the effective use of technology in schools and trains teachers on how, when and where to incorporate technology tools and resources into their lesson plans. It also helps them learn how to use technology to create in-depth, personal learning experiences.

Students worked in a one-to-one learning model, where each child has a computer that is connected to the teacher's laptop. From their laptops, teachers monitored and managed the activities of the students on their classmate PCs, such as administering tasks and enabling chats with and between students. Teachers also introduced topics on their laptop and used it to share audio-visual content with the students. Students used their classmate PCs to conduct research, participate in interactive lessons, and collaborate on group projects.

Classmate PCs: the Effective learning Tool

The classmate PC reference design was developed at Intel's Platform Definition Center to serve as an affordable, education-focused personal learning device for children around the globe.

These ultra-compact, affordable, easy-to-carry laptops are child friendly and stand up to rugged conditions. With durable drop-proof construction, a sturdy case, water-resistant keyboard and a carrying handle, they help students stay connected to a world of learning. With built-in wireless connectivity, you can connect to hundreds of web-based applications for learning, work and play.

Classmate PCs also include integrated educational capabilities to help teachers enhance the classroom experience.

Technical Specifications

- **Mobile Intel processor with ultra low power consumption fully compatible with Intel® Architecture**
- **Storage technology based on flash memory, several storage capacities could be available at launch time.**
- **7-inch 18-bit full color LCD screen**
- **802.11b/g wireless networking**
- **Built-in Rechargeable battery (up to 3 hours use)**

Teachers quickly noticed differences in student learning and Performance. "Our student's performance have improved greatly since the introduction of the Classmate Computers- each one scores now above 60%. The first set that used the Classmate PC's have continued to perform exceptionally well." said Mr. Mathew Amurawaiye- Technology Teacher in the School.

Students, teachers, and school administrators were pleased with the benefits of the 1:1 eLearning model. The model created a positive synergy among the school's staff. Students and teachers were enthusiastic, finding that the project environment made teaching and learning easier. On sample tests, the pilot classes continually scored higher than comparable classes in subjects where technologies were used.

"The Programme has been largely successful and very laudable. I call on Intel to continue to give us the support and assistance. We need systems with higher capacity so that we can expand the content and equally install anti virus protection which is not currently running in the systems we have. We in JSS Jabi shall continue to champion the Project. "

Mr. Lopez Igbinedion

Teacher.

Table 3: 1:1 e-learning Pilot Project Observations

Topic	Observations
Online content and professional development	To fulfill the needs of today's learners, it is necessary to improve curriculum and provide digital content and teacher training. The project In Nigeria is using Intel's award-winning Skoool™Nigeria.com curriculum resources, which applies advanced multimedia technology to help students master Mathematics and science.
New technologies	To meet the peculiar challenge of unreliable Power Supply, the project in Nigeria has evolved the use of inverter solutions combined with generators in schools. Another peculiar innovation made in Nigeria is the use of wireless access.
Student-centric problem solving and collaboration	The 1:1 e-learning project has resulted in a remarkable shift from the traditional 'teacher-centric' learning in Nigeria to a more 'student-centered' learning with students becoming more independent, exploring more and not depending on the teacher for every bit of information as was historically the case.
Ubiquitous access	The project provided students and teachers with the ability to access the Internet safely and use interactive content. The 1:1 eLearning practices promoted equal educational opportunities and gave all children in the project the chance to bridge the digital divide.
1:1 eLearning environment	The lower the student-to-computer ratio, the greater the positive impacts of the 1:1 eLearning model in creating a student centered environment.
Student motivation	Student motivation and performance increased with corresponding decrease in truancy and absenteeism from school.

Phase 1- JSS Jabi Findings and Challenges

General Findings:

- Increase in students' interest in their courses
- Increase in teachers' interest and motivation
- Higher attendance rates compared to traditional classes, perhaps as a result of teachers using techniques such as three dimensional animations and simulations to present lessons
- New self-development opportunities for teachers
- Increases in exam performance.
- Decrease in truancy and noise making.

Classmate PC makes learning fun!

Specific Findings:

- The school management made it compulsory for all teachers to be computer literate. Teachers who have benefited from training are thus involved in training other teachers.
- Teachers now prepare their lesson notes for the 14 weeks of the term on their laptops and submit examination questions as soft copies
- Teachers reported that they improved their technology skills and gained experience with 1:1 computing and project-based learning. They felt the project gave them an opportunity to improve their motivation and job satisfaction.
- 100% of the students said computers made school work more interesting and that using computers for school work improved their performance and marks. 83.8 percent admitted to enjoying school more when taught with computers
- All the teachers indicated that the project has helped their students develop improved typing skills, research skills, presentation skills and a greater ability

at understanding and problem solving. Teachers also said their students understood the lessons better, increased their technology skills, were more interested in their lessons, and were more motivated to complete their assignments.

- 80 percent of teachers surveyed agreed that 1:1 Computer learning is essential to their teaching while 100 percent said they found it easier to complete their teaching task grading, lesson preparation and communication using computers.
- Parents appreciated the program and its benefits for their Children/wards. 83.3 percent admitted the Project has reduced the time their children spent watching television, home video and playing outdoors. All the parents thought computers should be provided to all children as a standard learning tool.

The Challenges

- Of the total 240 systems deployed to the school, only about 180 are still fully functional.
- Majority of the faults have been related to screen problems. School reported that they are working closely with Intel and their partner Aretes Logistics to resolve the cases of malfunctioning systems.
- The government is yet to provide a perennial internet access solution for the school. They therefore have to rely on quarterly subscription model for very expensive internet solution. This quarterly subscription is often delayed due to administrative protocols.
- Teachers reported fluctuations in the internet service some of which lasted for many weeks.
- Power has also constituted a huge setback to the use of the model. The school uses a Generator as alternative to unreliable public power but this can not run continuously due to high diesel fuel and maintenance costs.
- The classmate PCs at JSS Jabi are of the 1st Generation which has lower capacity than the newer ones. This has undermined the efficiency of the e-learning model in two significant ways, viz;
  - Inability to install anti-virus software on the systems which has left the PCs which run on windows XP susceptible to virus attacks.
  - Limited content which currently supports only the teaching of math's & Science subjects.
- The Smart board has not been used effectively since installation as both Teachers and students are still getting acquainted with the use of online content.
- There are no over head projectors in classrooms.
- There are not enough Classmate PC's for all students. Currently, not all classes use the systems and a rotational model is now in use in the school

which allows all the students in the designated year level an opportunity of taking classes with the Classmate Pc's according to a schedule. This has however given rise to issues of time management and disruption of the normal school schedule.

- Teachers reported that while they now prepare their lesson notes on their laptops, they were still being compelled by the Education Inspectors to present the traditional hand written hard copies.
- Teachers of other ancillary science subjects such as Building Technology, Technical Drawing, Wood work, etc, do not have digital content to teach their courses, nor the requisite training to develop them.

……

"I suggest that an opportunity be created for us parents to partner in acquiring Classmate PC's for the children to learn outside school hours "

Achina A. Ephram (Parent)

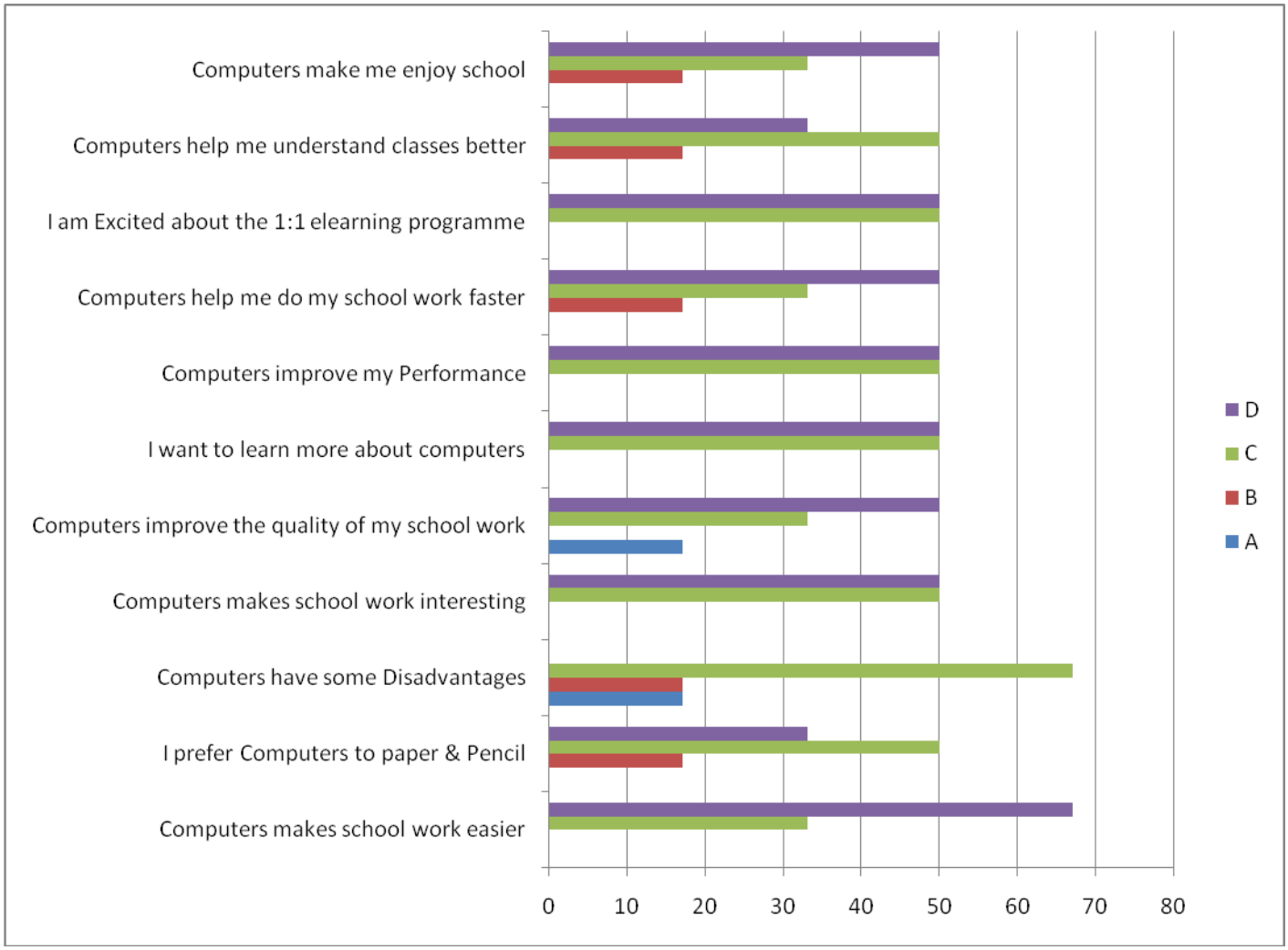
……..

A Student's Confession

"I use my classmate PC for many exciting things. I use it to find information for my assignments. I use it to take notes and also to complete my class works. We have been taught to always handle it with care. I enjoy using the classmate PC a lot"

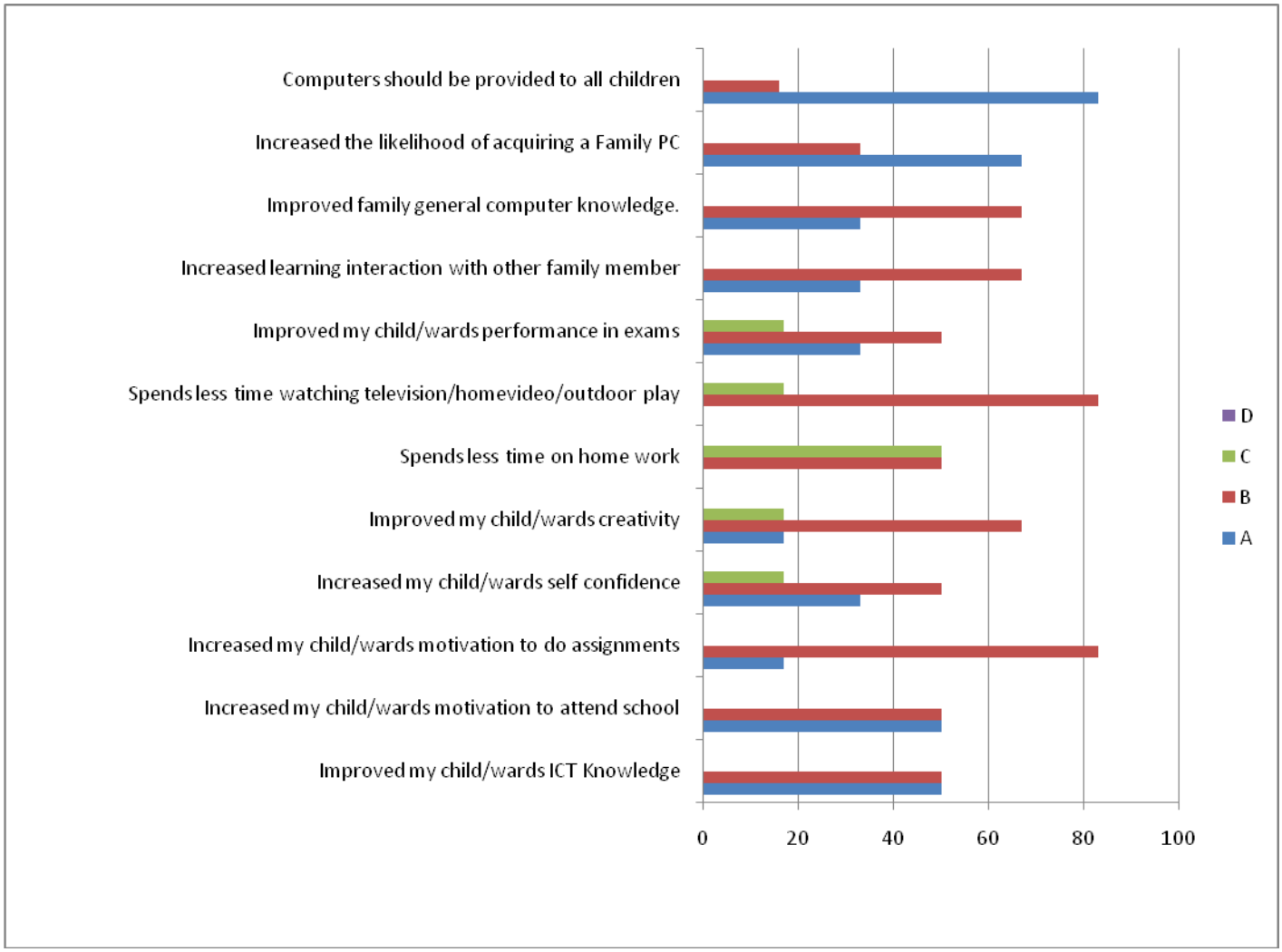
- ***Orisah Chibuzor JSS 3 Student.***

Fig II. Students Perception of Projects Impact on themselves



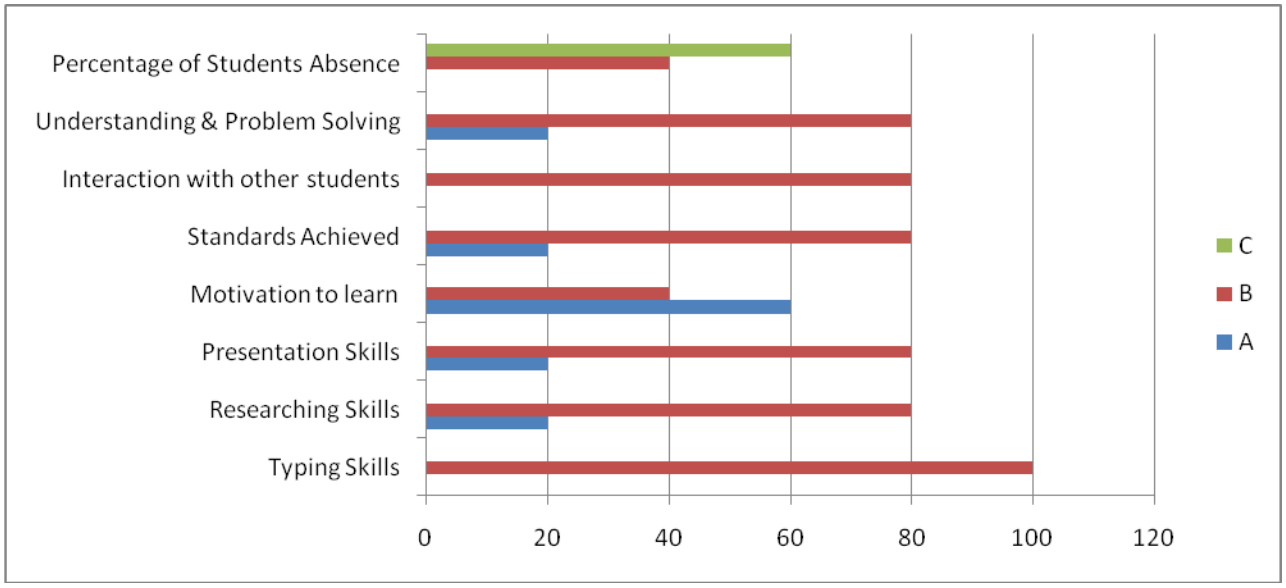
A: Strongly Disagree **B: Disagree** **C: Agree** **D: Strongly Agree.**

Fig III Parents Perception of Projects Impact on their Child/ward



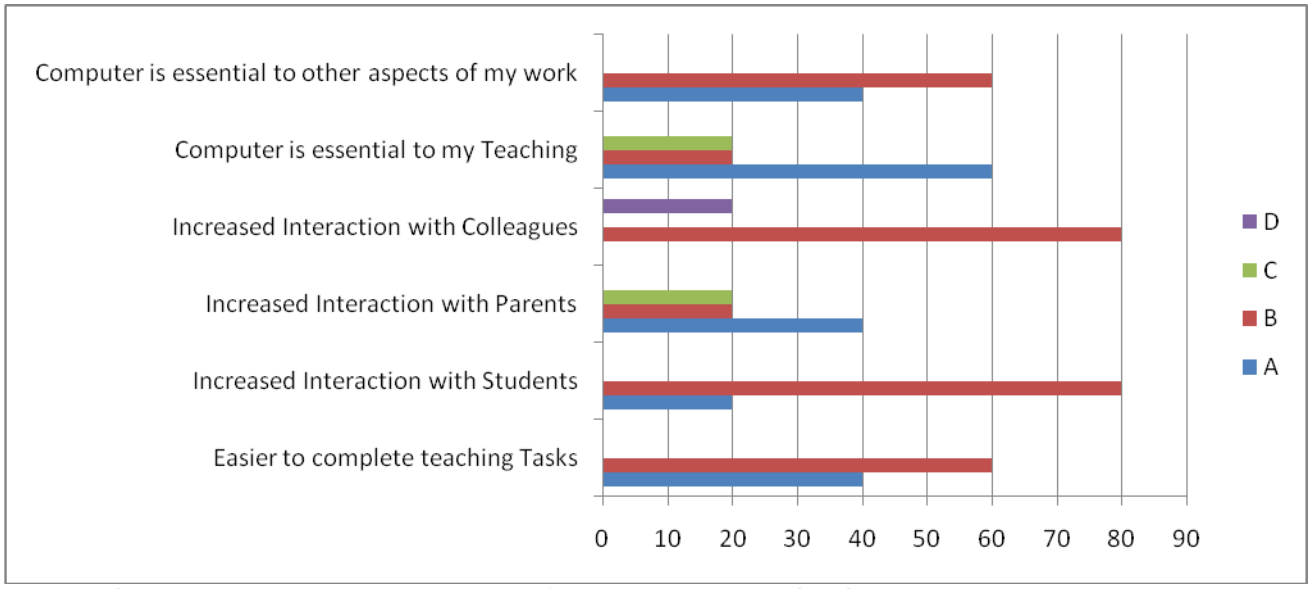
A: Strongly Disagree **B: Disagree** **C: Agree** **D: Strongly Agree.**

Fig. IV Teachers Perception of Project Impact on the Students



A: Greatly Improved **B: Improved** **C: Not Improved**

Fig V Teachers Perception of Projects Impact on themselves



A Strongly Agree **B: Agree** **:C: Disagree** **D: Strongly Disagree**

Phase II: OEMs and Private Schools.

With the success of the PoC and Pilot projects at JSS Jabi, Intel began working with Nigerian Original Equipment Manufacturers (OEMs) and expanded the e-learning model to private and public school across the country.

To assess the impact of this second phase of deployment of the classmate PCs and 1:1 eLearning model, four of these OEM's and seven of the additional schools were selected for evaluation using an participatory approach which integrated different fact gathering methods as follows:-

1) Administration of questionnaires to
    - Students
    - Teachers
    - Parents
    - OEMS
2) One on one Interviews with
    - School Administrators
    - Teachers
    - Students
    - OEMS
3) Direct observation of Classmate PC in use in the class
4) Physical examination of the state of the Classmate PCs after use.

The assessment team administered the questionnaires which were a mix of essay-type and multiple choice questions before conducting one–on-one interviews with 23 OEM Staff Members, 15 School Administrators, 30 Teachers, 120 Parents and 140 students to assess the effectiveness, efficiency and appeal of the project in the schools with focus on the successes, challenges, best practice and possible areas of improvement.

The Nigerian OEMS

The OEMs selected for the assessment exercise were:

- Aretes Logistics
- Zinox Technologies
- Chips, Bits and Bytes
- Technology Solution Center (TSC)

Working with Intel these companies carried out deployment of the classmate PC's and set up e-learning models in public schools (selected by the Government) and

private schools (marketed by the OEMs) that have chosen to adopt the model for the education of their students.

Each of these OEMs set up the Infrastructure on site, trained teachers and have carried out regular support and maintenance visits to the schools as well as repair and replacement of faulty parts in the deployed systems.

Specific Findings

- There is balanced mix in the choice of operating systems deployed by the project with some Classmate PCs running on Windows and others on Linux.
- The OEMS experienced accessibility and other logistics challenges in reaching and setting up the e-learning infrastructure in the public schools which are located in rural areas.
- The weak security infrastructure on site in most public schools has been a major challenge. In some cases, the host communities decided that all the equipment be kept in the local traditional ruler's (Chief) house for safe keeping and moved to the school for use when needed. In some cases, the equipment just remained in the Chiefs house as the villagers preferred to keep the "*special gift from Government"* as they see it safe there rather than expose it to theft or damage through use by irresponsible children. This even applied in some instances to equipment that was to be set up (e.g VSAT) etc.
- The OEMs have experienced significant challenges in procuring spare parts for the maintenance and repair of defective or faulty Classmate PCs.
- There is a general agreement among the OEM's surveyed that the second generation Classmate PC's is not rugged enough to be adequately considered child-proof. This has been attributed to the introduction of flex connected HD which has made the systems more susceptible to failure and inoperable when shaken or dropped. Suggestions made include the use of a flash drive to replace the hard drive.
- The sourcing of Classmate PC hardware in Nigeria is currently a supplier duopoly between TSC and Zinox Technologies who are also deployment partners to Intel. This situation has created an unfair advantage over the other deployment partners who have to depend on them for their supplies. This is characterized by delays in the supply of ordered systems and delivery of Classmate PCs that don't meet specifications. Specific examples recorded during the assessment include:
    - A 500 unit order Chips, Bits & Bytes paid TSC for in January 2009 was not delivered until July 2009.
    - At Meadow Hall School, Zinox branded Classmate PC's were delivered leaving Chips, Bits & Bytes with a very unhappy customer who had been expecting Intel Classmate PC's
- Subsequent to the initial training teachers receive when the Classmate PCs are deployed, retraining of teachers (which is frequently required) is usually done in an ad hoc basis and not by a clearly defined and scheduled plan.
- All the OEMs carry out post deployment maintenance of the deployed equipment. TSC, Aretes Logistics and Zinox do so on demand while Chips, Bits

and Bytes has scheduled maintenance visit to the schools periodically varying from every other month to quarterly.

- All the OEMs agree the project has been a success especially in increasing awareness and addressing the problem of basic IT literacy in education.

INTEL WORLD AHEAD PROGRAM

Intel is working with governments, development organizations, community groups, and other technology leaders to create the world ahead — a place that empowers the next billion people through:

- **Access to technologies best suited for local needs. Intel makes this happen with programs that help people obtain the right technology and technologies designed for emerging markets.**
- **Connections to the world via high-speed technologies. Intel helps to lead industry efforts around the world to make Internet access more affordable and accessible.**
- **Education that prepares them for the future. Intel provides programs, technology, and resources that encourage better learning. Students and teachers enjoy 21st century learning environments that prepare students and other citizens for success in a changing world.**
- **Content and services that improve their lives. Intel collaborates with governments, international organizations, education and healthcare leaders, and local businesses to deliver information, entertainment, services, improved learning, and economic opportunity that people really want.**
- **Healthcare improvements via technology. Intel promotes use of digital technologies to deliver higher quality healthcare services, reduce inefficiencies, and enhance medical education. Our innovative technologies and programs with government leaders, healthcare experts, and medical organizations help improve quality of life for citizens in developing communities.**

The World Ahead Program is Intel's global initiative which aims to enhance lives by accelerating access to uncompromised technology for everyone, everywhere. Focused on developing communities, it integrates and extends an effort to use technology to help people improve their lives, societies, and economies.

Supported by the Intel World Ahead Program, Nigeria is moving to bridge the digital divide and increase opportunities for jobs, education and participation in the global economy. Learn about Nigeria's challenges and achievements, and see what best practices are emerging from this successful private-public collaboration.

> **"It's a wonderful project and it has been a success but for the Government (public) schools, there has to be more commitment from both government and Intel especially as regards training and Infrastructure to ensure sustainability of the project."**
>
> **Dalo Edetalen**
>
> **(CEO, Aretes Logistics)**

The Private Schools

Seven schools (all private) where the Classmate PCs had been deployed for the 1:1 e-learning model similar to that at the pilot government school JSS Jabi were selected for the assessment exercise.

1. The Treasure House Montessori School, Asokoro Abuja.
2. Junior Secondary School Jabi, Abuja
3. Funtaj International School Asokoro, Abuja
4. Doregos Academy, Shagari Estate, Ipaja, Lagos
5. Rightville School, Alaka Estate, Surulere Lagos
6. Meadowhall School, Alpha Beach Estate, Lekki
7. Chrisland School Ladipo Oluwole, Ikeja.

Most of the schools while using the Classmate PCs, were not using the 1:1 e-learning model because the Teachers had not been trained and the full e-learning environment were not set-up when deploying the systems both due primarily to cost constraints.

In the case of Chrisland School, the Classmate PCs were locked up in a safe cabinet while in Doregos Academy the team witnessed them being used to teach the students various aspects of computer appreciation and basic applications such as Ms-word and Typing Tutor.

Specific Findings

- All the teachers said the project has increased the student's motivation to learn. 87.5percent said their students typing skills had improved. While 75percent observed an improvement in the students ability at understanding and problem solving
- 82.7 percent of the students expressed excitement about the 1:1 e-Learning project while 59.1 percent agreed that the Classmate PC's have helped them improve the quality of their school work. 66.6 percent said the PC's had helped them improve their performance and test scores. The Students also expressed their love for Computers with 93.6 percent admitting they wanted to learn more about computers.
- 87.6 percent of surveyed teachers stated that computers were essential to their teaching.
- While 95.8 percent of parents agreed that children should be provided with computers as a standard learning tool only 37.5 percent agreed that the project had improved their child/wards performance in exams while 66.6 percent said the project has not increased their likelihood to acquire computers for the family use.
- Most of the OEMs (87.6 %) agreed that the Classmate PC's has enough capacity to meet the educational needs of the students.

Challenges

- There aren't too many happy success stories in the schools assessed under the Phase II of the project. The following findings can therefore be taken as a representation of the peculiar challenges faced by participating schools across the country:
- The Wireless LAN card in the Class Mate PC's is distance challenged which when coupled with weak router signal strength renders students incapable of using their systems at any significant distance from the router due to the overall systems poor connectivity capabilities.
- The learning software requires upgrades to address some bugs such as there are frequent disruptions to classes as a result of the logging-off of the Teachers laptops by the Blackboard Class Control Application for example. In the words of the teachers, the system "Hangs" causing an interruption of communication between the teacher's laptop and the students Classmate PC's.
- The Classmate PC is not as rugged as it needs to be as the introduction of Flex technology in the second generation Classmate PC's has made them more fragile and less child-proof. This is evidenced by error messages when they are swung around and damage to the screen when dropped. Of the 1000 systems deployed to Funtaj Academy Abuja by Atretes Logistics, 60 were returned with broken screen within two months of deployment.
- Teacher 1:1 eLearning Training has not been integrated into the OEMs deployment as a fundamental component and so constitute a major hindrance to the project's success. As at the time of assessment, the teachers at Doregos Private Academy and Right Ville School were yet to be trained by the deploying OEM (Zinox Technologies) and as such could not set up or operate the 1:1 e-learning model in either school. The former opted out of answering the 1:1 questionnaire as they had no experiences to share.
- Deployment of first generation Classmate PCs are not contributing to a negative perception of the project by schools. Chrisland School described their relationship with their deployment OEM Chips, Bits & Bytes as "Disappointing" bemoaning the fact that the 25 deployed systems (which were of the 1st generation architecture) was of "low capacity and virtually useless to the students". The Head Teacher Mrs. Belinda Amao actually refused to allow any contact with parents to avoiding reviving issues related to the project that she and her staff had just recently resolved.
- Maintenance and support of schools is not consistent across OEMs. Doregos Private School complained of being charged for maintenance and repairs despite the one year warranty on the deployed systems. The response time after a complaint is made is seen as long and it takes even longer before systems taken in for repair are returned.

- Power has been a major challenge to the use of the e-learning model in schools just as it is to the entire nation. The schools have to run on Generators which is not always possible. While some schools have deployed inverters as backup power, there are currently no schools using solar power to run the systems.

.....

"Yes, it is very good for children and I am thanking you for your kindness in introducing it to Treasure House Montessori school"
Abubakar Garba Ahmed

"Intel is doing a great job and pushing technology. The Classmate PCs have the potential of adding a great value to the lives of the Children."

Mr. Adetola Adewale
(IT Head, Chrisland School).

(Primary Pupil, Treasure House Montessori School, Abuja.)

.....

ONE TEACHER'S STORY

"The Classmate PC's and e-learning infrastructure has made learning more interactive and fun for the students. There is less noise in class and the students have taken time to explore and learn many new ideas on their own. For example with the dictionaries on their system, they easily find out the meaning of new words as they encounter them.

As a teacher, it has taken away the traditional way of teaching. We now don't need to write on the black board. From my system I can teach my lessons and send instructions to every individual student. I can also monitor all what they do without leaving my desk.

It is important that Teachers are computer literate so that they can easily imbibe and use the new technology as a teacher that is not computer literate can not enjoy the use of this model in teaching

I must say however that the systems are too fragile. I can remember vividly when they (chips Bits & Bytes) came here to market the system to us; they claimed that the systems were very rugged. In fact they boasted that you could drop it from a height and nothing will happen. Unfortunately it's not so with the systems they deployed. We have many cases of broken screens and the operating system keeps going off when the children as much as swing their systems."

Mrs. Obasanya
(Teacher, Meadow Hall School Lekki, Lagos.)

PARENT REACTIONS

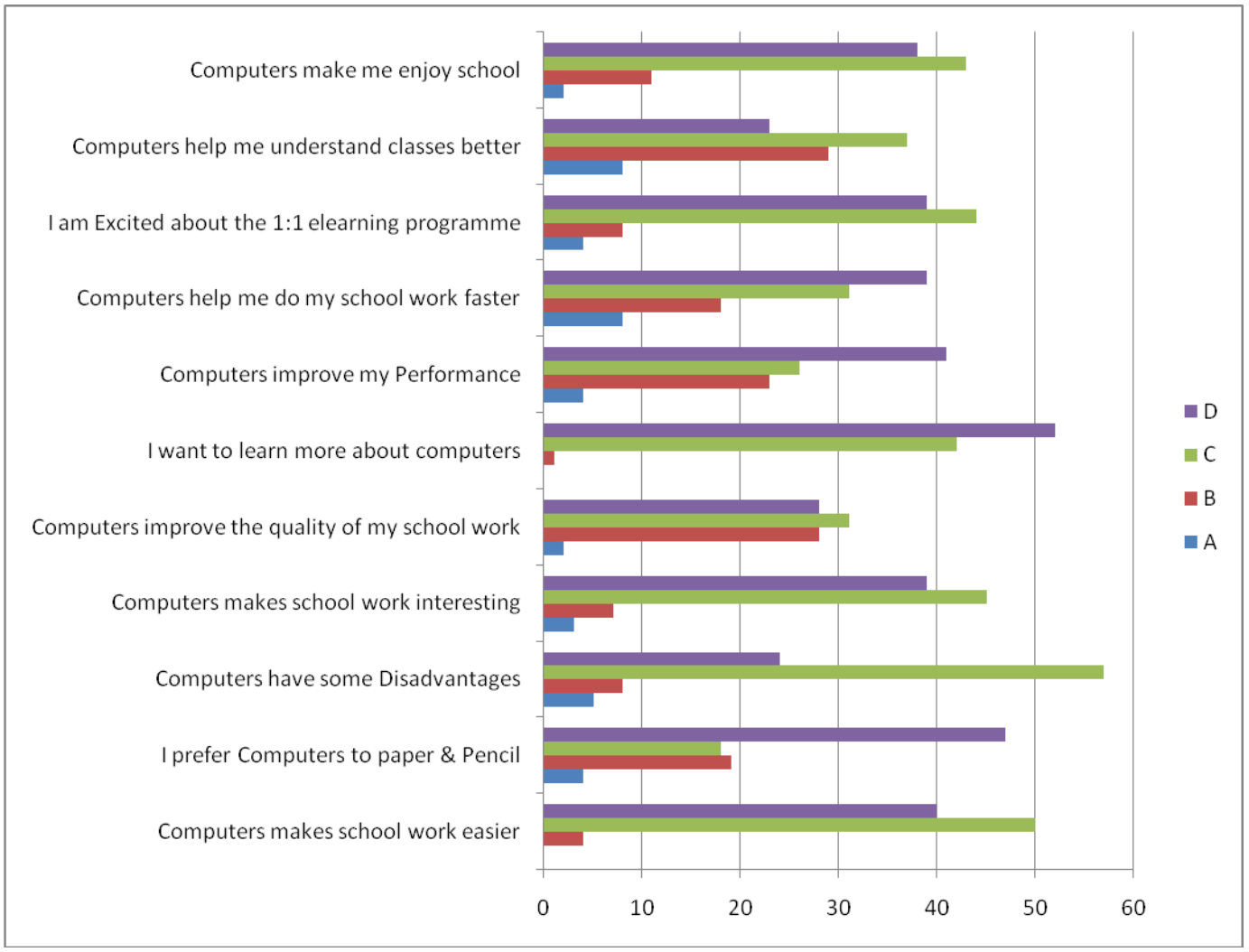
"I am indifferent about this e-learning concept because it looks like a survey was not actually done before rushing into it. I suggest that it should be researched into and perhaps you (Intel) come up with a better way of doing it. For now, I am not impressed"

Mrs. Ify Lawrence Nsa (Parent)

"The programme should continue if only they can make the computers work . As they are now, they are little more than toys as they can't be utilized. The moment they are switched on and used for some time, it freezes and has to be turned off and back on and the same thing repeats itself again. Please rectify what the problems is otherwise, it would just be a waste of money"

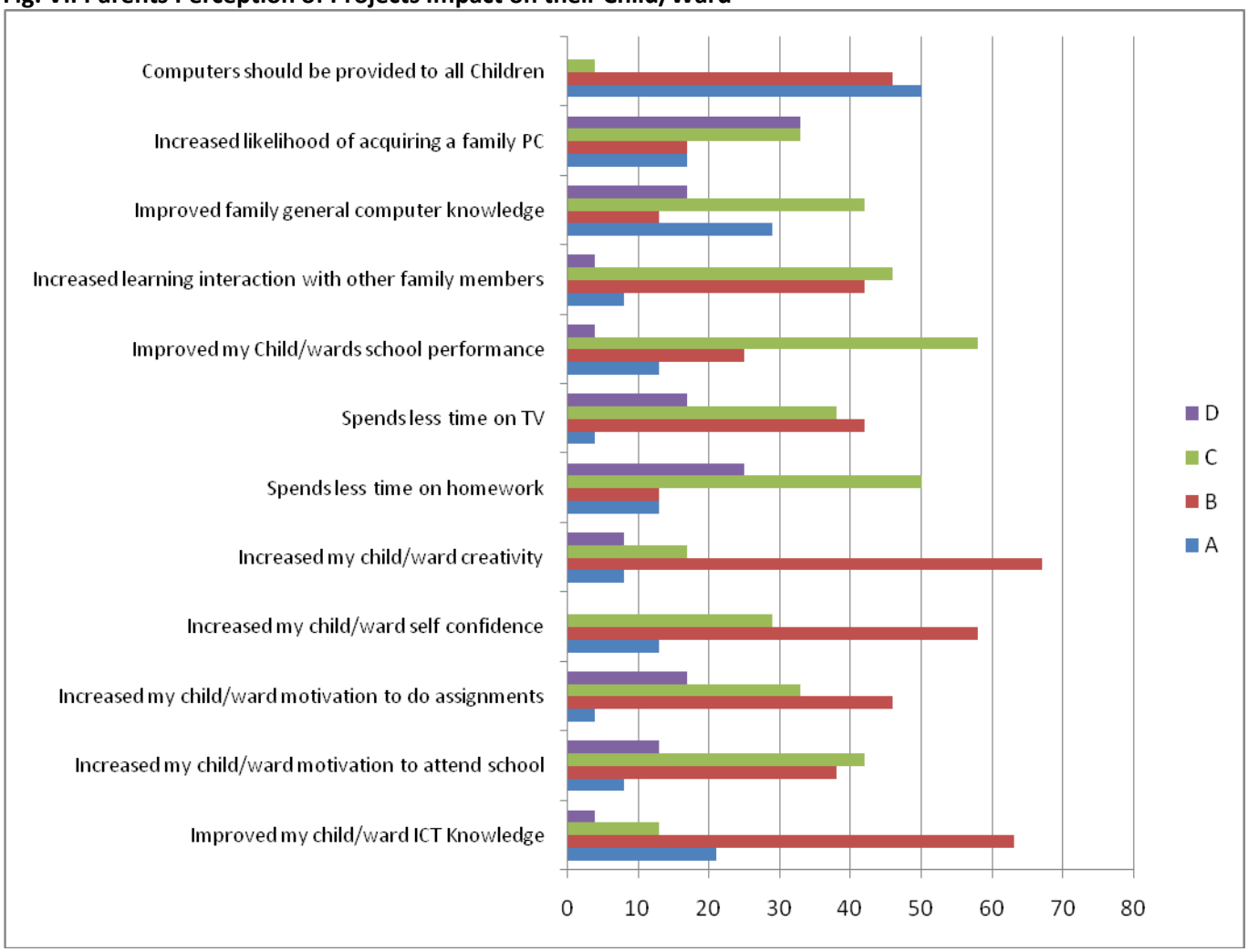
Mr. Armitau Baba (Parent)

Fig VI. Students Perception of Projects Impact on themselves.



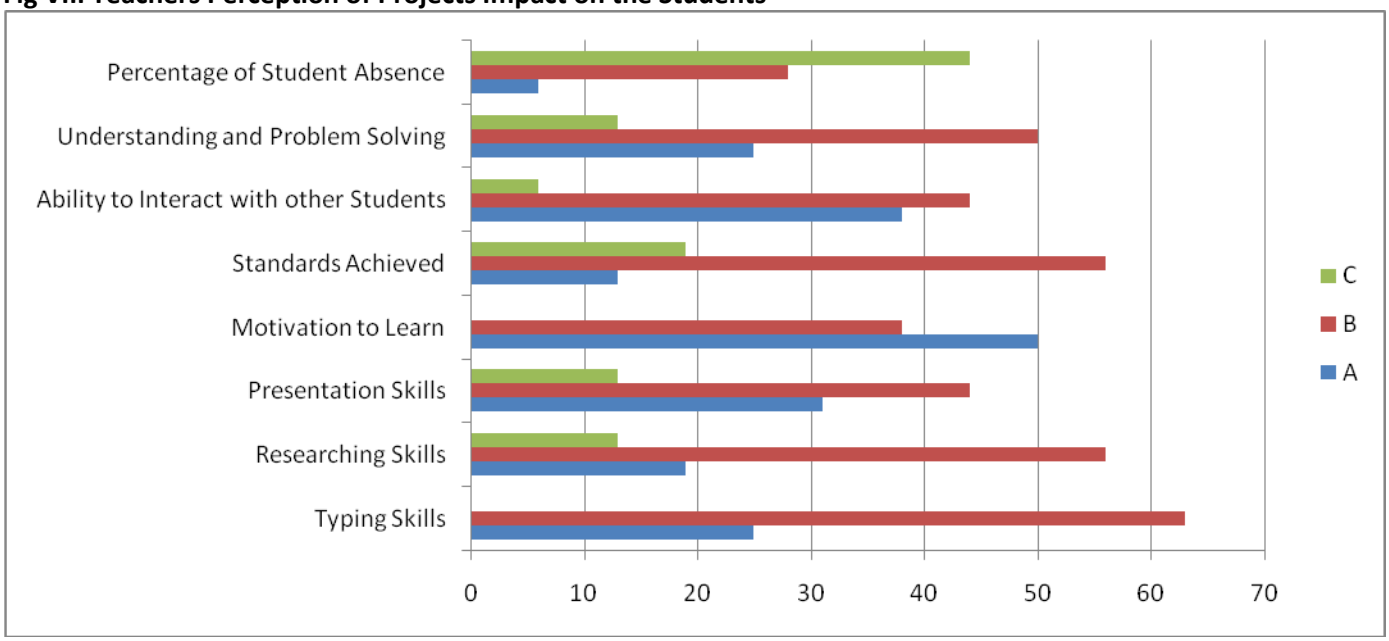
A Strongly Disagree B Disagree C Agree D Strongly Agree

Fig. VII Parents Perception of Projects Impact on their Child/Ward



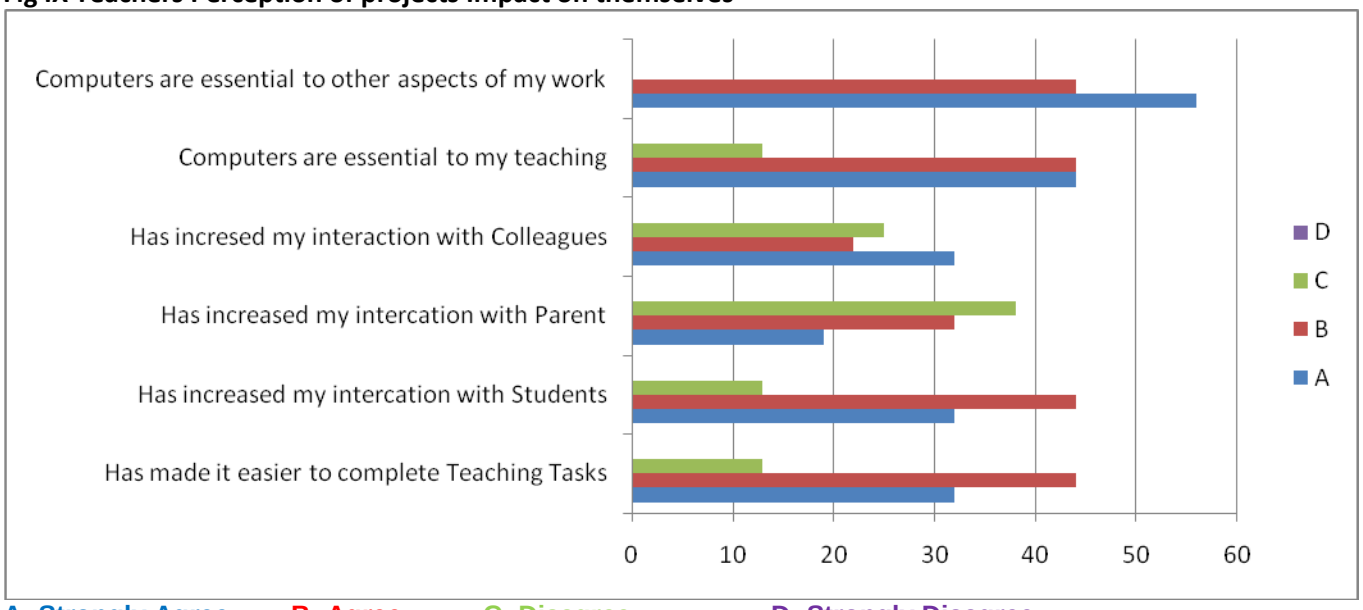
A: Strongly Agree **B: Agree** **C: Disagree** **D: Strongly Disagree**

Fig VIII Teachers Perception of Projects Impact on the Students



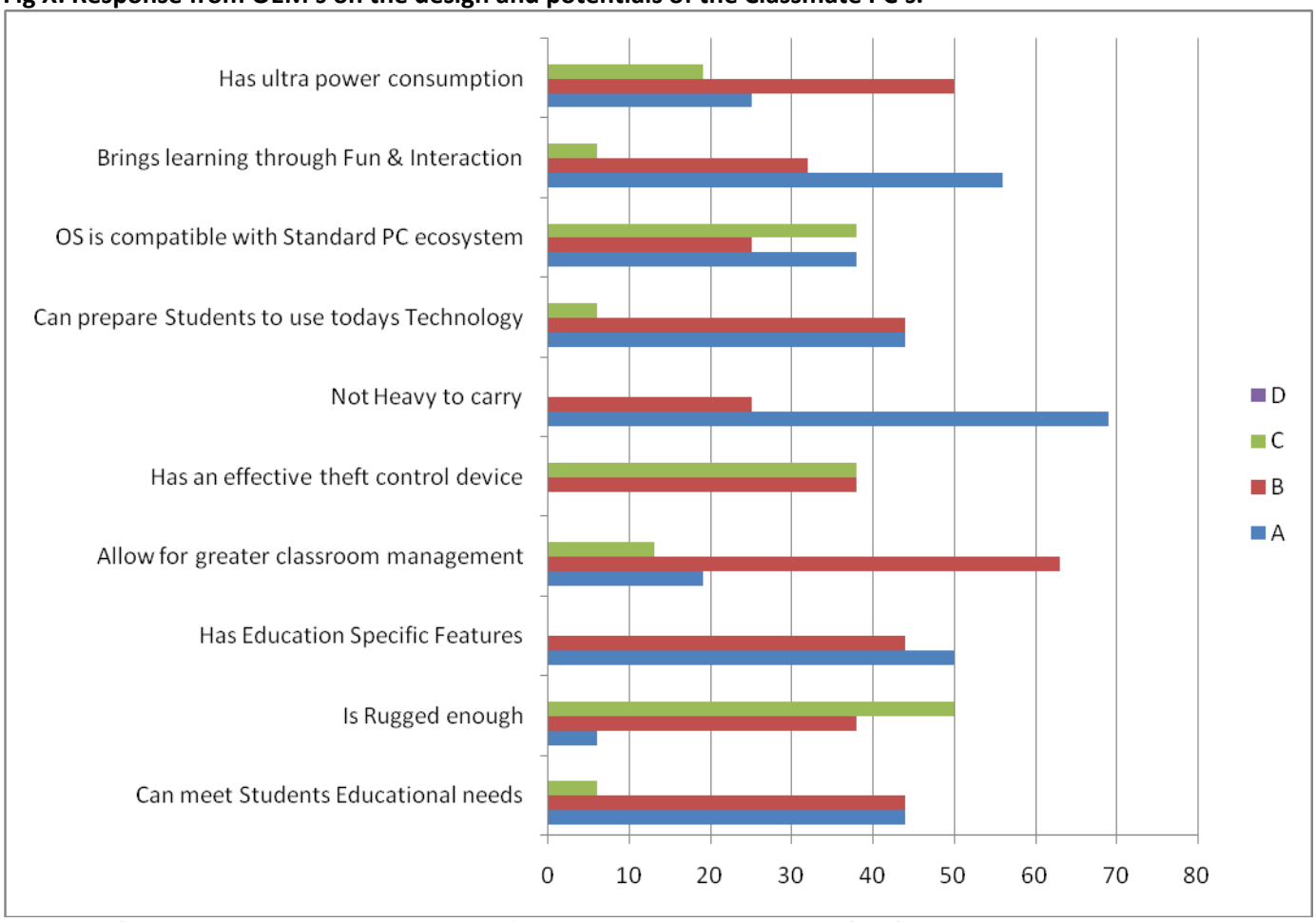
A: Greatly Improved **B: Improved** **C: Not Improved**

Fig IX Teachers Perception of projects Impact on themselves



A: Strongly Agree **B: Agree** **C: Disagree** **D: Strongly Disagree**

Fig X: Response from OEM's on the design and potentials of the Classmate PC's.



A: Strongly Agree **B: Agree** **C: Disagree** **D: Strongly Disagree**

Looking Ahead in Nigeria

The Vision Statement on ICT in Nigerian's Vision 20, 20:20 document, a document which represents Nigerians long term development plan, one that in the thinking of her leaders will see her among the twenty most developed Countries in the world in the year 2020 plans to see Nigeria attain an information and knowledge-based economy and society that is efficient and technology-enabled through a globally competitive ICT Industry.

To get there, Nigeria needs to raise a generation that is ICT literate and enthusiastic to use information and communications technologies (ICT) to solve their immediate problems, improve opportunities and enable Nigeria to play a larger role on the world stage.

Nigeria is one of the bright stars of sub-Saharan Africa. The continent's most populous country, Nigeria has rich oil reserves, a growing middle class, a young democracy and a youthful population. The average age is 18.7 and four million babies are born annually.

These four million Nigerians represent the future, those who the ICT vision is for, those whose responsibility it would be to drive the vision in twenty, thirty years. The easiest way of achieving the vision therefore is by expanding the use of ICT in the education system today especially at foundation levels.

Nigeria currently offers free education for students in primary 1-6 and Junior Secondary 1-3 under the Universal Basic Education Programme and boasts of approximately three dozen institutions of higher education. However, one-third of the adult population lacks basic literacy as the nations education infrastructure is lacking or out of date.

The failure to properly carry out the training of teachers as a perquisite for the 1:1 e-learning project is largely responsible for the negative feedback received in this assessment for most of the phase II schools.

Studies carried out in the past such as Okafor & Umoinyang (2008) have shown that majority of teachers are computer illiterates and thus can not effectively teach primary concepts with ICT facilities. This is collaborated by Apanpa & Lawal (2009) in their research on the ICT competences of teachers at the Secondary School level. Their finding revealed a low level of competencies on the part of teachers.

Okafor (2006) opines that it is only a computer literate teacher that can effectively use the vast electronic information available in the world for teaching improvement.

The potential for students to acquire important technical capabilities thus resides in the teacher, this is because it is the teacher that is responsible for establishing classroom environment and preparing the learning opportunities which facilitates students' use of technology to learn and communicate.

RECOMMENDATIONS FOR SUCCESS

As we look to the future, there is a need for Nigerian educators and policy-makers to improve basic literacy and to make education ICT based.

These could be made achievable by implementing some if not all of the following recommendations:

- All organizations and institutions participating in e-Learning should embrace the use of comprehensive approaches that integrate teacher training, curriculum development and digital content with equipment deployment programmes.
- Teachers must be trained as part of the deployment to schools and continuously trained through a planned schedule of refresher 'hands-on' practical courses to ensure their continued effective use of the model and the help solve any challenges they might be encountering.
- Intel should partner with a local firm in Nigeria to specifically carry out the Intel® Teach Programs 1:1 e-Learning training and re-training of teachers in schools the Classmate PC's are being deployed to. Intel could then monitor such activities to ensure that the training is suitably conducted and to its prerequisite

standards. This would relieve the OEMs of such obligations enabling them focus on core competence around equipment deployment.

- As a matter of policy, we advocate as Akudolu (2000) did, the incorporation of "computer studies" and "use of computers in teaching" into teacher education programmes. This would prepare teachers for effective utilization of ICT facilities to enrich classroom instructions.
- The curriculum for all levels of education must be supported with digital content which must be put under a process of continuous development to reflect changes in the educational system and curriculum. This must of course include support for OEMs and other Intel partners as practiced in other markets.
- The Classmate PC supply chain for Nigeria should be restructured to ensure it is competitive and fair to all participants for sustainable market growth.
- Considerations should be given to enable the development of local educational software and content to take advantage of the Classmate PC platforms uniqueness.
- Consideration should be given to Parent participation in equipment acquisition on behalf of their children as this will develop an enhancement to the maintenance of the Classmate PCs from the sense of asset protection such ownership will drive. This especially as the government obviously cannot procure Classmate PCs for all the students in their schools.
- Government should develop an e-Learning Fund dedicated to the provision of digital infrastructure (i.e. Power, Connectivity & Storage) for schools across the country. This would leave the digital curriculum content, access equipment, Teacher Training etc to programmes such as Intel's and those of other development partners.

Moving Nigeria into the World Ahead through Education

Education: 21st Century Teaching and Learning

Historic indicators show that Nigerian educators and policy-makers have always been determined to improve basic literacy and create a new generation of leaders. To this end, Nigeria offers free education for primary schools and junior secondary schools, and has over five dozen institutions of higher education. However, less than a third of Nigerian children between the ages of (equivalent of grades 7 and 12) are in school, over a third of the adult population lacks basic literacy, and the education infrastructure in most parts are lacking or outdated.

It is to help meet this laudable yet seemingly unachievable goal that the Intel World Ahead Program is supporting Nigeria on a variety of projects to transform teaching and learning within the country. Intel has begun by sharing a comprehensive, sustainable approach that promotes 21st century learning environments through an effective mix of technology, connectivity, teacher training, modern learning methods and digital curriculum content.

The introduction of low-cost PCs with ample battery life has helped scale the hurdle of epileptic power supply thus sanctioning the use of technology in schools without the fear of power interruption thereby providing accessibility to technology even in the remotest of areas. As this becomes commonplace, the digital literate Nigerian will become the norm rather than the exception.

The projects use of inexpensive Wi-Max technology to connect schools to the Internet has dramatically reduced the cost of bandwidth which was traditionally provided via satellite technology, an expensive solution whose maintenance costs was a deterrent to sustainability of government funded connectivity for schools.

Localized curriculum content from Skoool Nigeria and other local ISVs available to children and parents has opened an avalanche of learning opportunities that is driving a heightened desire for education in Nigerian homes and a craving for integration of digital content based activities in the schools.

All these modernized education components galvanized by a well orchestrated process of teacher training using the e-learning tools, creation of e-learning content and basic PC appreciation bundled into Intel's Teach Program is providing Nigerian Teachers with the capacity to produce increasingly improved results.

This cohesive approach of advancing technology usage in education has started having resounding effects on the populace with overwhelming reception from the government.

Intel's partnership with Nigerian institutions in advancing technology usage models in education has also helped kick-start ICT advancement in other sectors of the country's economy. The local software industry although nascent has seen creation of jobs for developers of educational products. Hardware manufacturers are evolving their capabilities from finished products and CKD importation for assembly and aiming for increased local content. The adoption rate of new technologies for deployment by connectivity providers is on the increase. All of these progressive developments are positively impacting ISVs and other service providers.

As Intel's World Ahead Program continues to facilitate the growth of businesses, educational standards and an increasingly skilled labor force across the world, the peculiarities and adaptability of its components which as used in Nigeria have indigenous inputs from Nigerians will no doubt continue to be a critical success factor.

As Nigeria marches ahead towards its goal of basic literacy for all and the creation of a new generation of leaders, it is a true example of Intel's World Ahead Initiative impacting the lives of people using its pillars of connectivity, accessibility, content and education.

The full impact of Intel's work in Nigeria will no doubt become most evident when the next generation of digitally-savvy engineers, doctors, teachers, lawyers, administrators etc begins to take its place as leaders of this great African nation tomorrow.

This page left intentionally blank

References

Agyeman Osei Tutu (2007). ICT For Education in Nigeria. A Survey of ICT and Education in Africa. A Nigeria Country Report.

Akudolu L. R (2000). Restructuring Nigerian Secondary Education System through Information and Communication Technology (ICT) driven Curriculum. A paper presented at the World Council for Curriculum and Instruction (WCCI) Nigeria Chapter, Abuja.

Apanpa O.S and Lawal O.O (2009). ICT-Competencies of Teachers of ESL in Ngerian Secondary Schools.

Intel. Fact Sheet in Intel-Powered Classmate PC. www.intel-poweredclassmatepcfactsheet_0507.pdf

Intel (2007).White Paper: Bridging the Digital Divide in Nigeria. www.intel.com/worldahead

Intel (2007). Connecting People to a World of Opportunity; The Intel World Ahead Programme.

Mac-Ikemenjima D (2003). The integration of ICT into the school system: Our roles. Paper presented at the students leaders IT conference.

Mac-Ikemenjima D (2005). E-education in Nigeria: Challenge and Prospects. A presentation at the 8th UN ICT Task Force meeting. April13-15 2005. Dublin, Ireland.

Okafor P.N and Umoiyang E.I (2008) Towards Enhancing information and Communications Technology (ICT) Compliance of the Primary School Teachers for effective teaching. In MSTA Journal. Fall 2008. www.msta-mich.org

Okafor P.N (2006) Availability and Utilization level of Information and Communication Technology (ICT) tools in the Teaching of primary Science. A Paper presented at the 11th Annual National Conference of National Association of Women in Colleges of Education (WICE) held at Adeniran Ogunsanya College of Education Oto Ijanikin Lagos.

Report of the Vision 2020 National Technical Working Group on ICT. July 2009.

World Development Indicators 2007. The World Bbank.

Cover Picture adopted from Intel- Powered classmate Pc's. Impact Stories; Nigeria. An Intel Corporation publication 2008.