

# ICT AND CHEMISTRY EDUCATION IN NIGERIA: PROSPECT AND CHALLENGES

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## **Abstract**

The introduction of ICT has completely revolutionized the educational programmes of many countries. Nigeria as a country has not effectively keyed into this innovation thereby reducing the quality of pedagogy that has inadvertently eroded global competitiveness of the present set of school leavers. Hence this paper tried to examine the global benefit of ICT and also tried to examine why the adoption of ICT has been difficult, vis a vis government negligence, stakeholders non implementation policies and the abandonment of laudable and promising project with the exit of the initiator of such policies or the end of an administration. Further articulated strategies that would help to reposition ICT for the successful implementation of chemistry education programme in Nigeria were highlighted.

## **Introduction**

The abbreviation ICT implies Information and Communication Technology, which though is not a new term, yet remains a relatively new phenomenon in developing countries and Nigeria especially. ICT have helped to make the world a global village by making relevant, up-to-date information available to everybody in every part of the world by making use of a device called computer.

A computer according to Williams and Lipesey (1995) can be defined as an electronic device that is capable of storing and executing programmes. The globalization of the world has made it necessary to disseminate information, innovation and Nobel problem solving ideas and techniques to various parts of the world in order to solve mans problems and make the world a better place, the computer is however saddled with this responsibilities. The supremacy of nations is not just in the novelty of its scientific and technological endeavours but the time frame between when the idea is generated and when it available to the world.

## **ICT in Education**

The way people work, live, play and interact worldwide had been affected considerably by the global pace of change brought about by new technologies. For our education to be relevant and meet up with the current global challenges in the society, the school curriculum need to be tailored towards the current global ICT revolution. Olele (2008), stressed that the application of computer and internet technology in education is a primary concern for education all over the world, hence accessibility to the unlimited global trend and innovation is imperative if the quality of graduates produced by the educational institutions in any society is to meet up with global standard and be able to compete with their contemporaries in any part of the globe.

Learning, with the current global ICT trend has successfully being changed into a lifelong activity, and the classroom boundary has been dissolved, hence for the teacher to be able to live up to his personality and professional qualities, the teacher need to have not just knowledge of ICT but an up-to-date and relevant knowledge of useful packages.

According to Okolo (2005), ICT also offers opportunity for school science programmes to provide students with up-to-date information, and tools for simulation and modeling of science process and principles. No wonder Chemistry being a core science subject has witnessed a lot of changes over the years both in curriculum and instructional method in order to meet up with the global ICT trends and challenges. The application of ICT in chemistry cannot be overemphasized as described using the following points.

#### **Accessibility to Chemistry Research**

ICT has made it possible for chemistry research of global standard and usefulness to be readily available over the internet, not only did this solve problems but it has made it possible especially for the third world countries to have access to newer, more economical and environmentally friendly (green chemistry) method of chemical synthesis.

#### **Computer Software and Calculators**

Softwares are now available that can help chemist draw structures of even the most complex organic or inorganic compound or complexes in a very neat, beautiful and shortest possible time, same can also be projected during conferences and seminars without any alteration in the originality and uniqueness of the work.

Similarly, problems in physical chemistry which is popularly known to be calculation rich can now be solved by a simple click of an appropriate button as there are digitally operated computers referred to as scientific calculators that can carry out complex mathematical task, such as: integration, differentiation, sine, cosine, tangent, etc.

#### **Graphical Representation of Spectra and Interpretations**

ICT has now made it possible for analytical results of Ultraviolet radiation, Infrared, Nuclear Magnetic resonance and Mass spectra of chemicals or other synthesized compounds to be determined with a great speed, accuracy and less time. The structural elucidation of an unknown compound that before now seems completely tedious and impossible is now quite easy through the application of ICT.

#### **Technologically Based Lesson/Lesson Plan**

Peterson (1995), observed that ICT has made it possible for data, images, voices, and video to be sent and received through both wireless and fixed wired devices, thereby making teaching and learning global and more meaningful. It is now also possible to use Audio-visuals to present abstract lessons and to enhance the learners understanding of such concepts, using devices such as Video, television PowerPoint presentation, internet, etc. this devices apart from it fascinating nature also saves the teacher the stress of improvisation which most time leads to the production of a material that though looks like the original object but also capable of distorting a learners understanding of certain concepts depending on the teachers mastery of the use such improvised materials and the learners age.

Before now, preparation and presentation of students results after terminal or semester examination as the case may be has pose a serious challenge to teachers and other stakeholders but with the use of computer packages such as seen in WASSCE, NECO and JAMB, marking of objectives questions is now as simple as A, B, C. not only that but the results can now be assessed easily as preparation, presentation and feeding of results into an institution or examination body website is done with relative ease, it no longer take ages to access external/standard examination results.

### **Accessibility to World Class Chemicals/Reagents.**

ICT has made it possible through the use of e-banking and internet services for chemist to access and purchase scarce reagent/chemical from reputable world class chemical manufacturer/industries. This has gone a long way in solving the problem of non-availability of certain chemical/reagents. The chemical industries/manufacturer on their own part are now able to advertise their products and services to a very wide range of chemist through the use of ICT facilities. World-renowned chemist, chemical organization and researchers also post the findings of their research works on the Internet in order to help solves mans challenging life problems.

### **Factors Militating Against the Contribution of ICT to Chemistry Education**

Laudable as the contribution of ICT to the development of chemistry education seems, there are a number of factors militating against it, some of which are highlighted below:

#### **Lack of Mobilization/Sensitization**

For about a decade now, there had been a serious talk and pronouncement on ICT but as far as chemistry education is concerned issues relating to ICT has remain only a news, story, or better still a propaganda or even a fallacy, because there is yet to be a deliberate attempt at sensitization of the key player in chemistry education. Sad enough, most chemistry teachers especially in the tertiary institutions and their students still see ICT as exclusively the affairs of those in computer science department.

Rather than mobilize chemistry teachers/lecturers and students government had continue to make pronouncements, decrees and policies that were either never implemented or when partly implemented, the few available spaces/materials are given to principals, staff of the ministry of education or other stakeholders in the educational sector who in most cases are non-chemist or have nothing to do chemistry.

#### **Lack of Computer Knowledge Among Chemistry Teachers/Lecturers**

Most chemistry teachers/lecturers still lack the basic computer literacy and numeracy, it is so bad to the extent that most of them cannot switch on a computer and boot it successfully, and sad enough these are the people to build up tomorrow leaders, no wonder most Nigerian graduates cannot compete with their counterparts in other parts of the world, not only that most of them are not computer literate, off course, how would they be when those moulding them are not computer literate. There is a popular saying that “you can’t give what you don’t have”. Hence it is not a surprise that today’s chemistry graduates are not ICT compliant.

#### **Non-Implementation of Government Policy**

Akajagbor and Oni (2009) assert that chemistry plays a vital role in the development of the human resources required in the economy. This implies that any nation that is interested in the development of its economy must pay adequate attention to its human resource development, since it is the prerequisite for national development, but sad enough Nigerian government is still busy making beautiful policies and programmes that would like other similar policies of the past never see the light of implementation.

Furthermore, Akajagbor and Oni also stressed that chemistry is at the core of national development and hence no country in the world today can attain scientific and technological supremacy without meaningful contribution by chemistry. No wonder Nigeria is still swimming in the

ocean of poverty and underdevelopment after about fifty years of independence, because the world had already become a global village and the entire human activity are ICT driven but our chemist cannot make their own contribution due to the non provision of adequately conducive environment, misplaced priority and corruption which has eaten deep into the fabric of our national life. We hear of millions and even billions of naira expended on political summits in the country but no one cares what happens to education and the meager allocation that goes to education which government always give the title of ‘Lion share’ makes little or no impact on science education because at the end of the day the Lion will always come back to claim it share.

### **Stakeholders Negligence**

Stakeholders in the educational sector, especially those that have one thing or the other to do with chemistry are not helping matters at all. Perhaps, due to the fund demanding nature of chemistry education in general and particularly as it relates to ICT, most stakeholders cannot see reason to justify the huge financial implication of an ICT driven chemistry education as such chemistry lecturers/teachers in the nations educational institutions are gradually rotting away by the day. For instance, let imagine a scenario where there is an opportunity for a capacity building workshop or conference, the stakeholders would rather prefer that their sectaries or Head of unit or school as the case may be to benefit from such capacity building exercise. Not only that, the financial implication look irrational to a non-scientist or an individual that has no scientific orientation.

### **Lack of Interest on the Part of Chemistry Lecturers/Teachers**

The non-challant attitudes of most chemistry lecturers/teachers have constituted a serious impediment to the contribution of ICT to chemistry education. It is sad to note with dismay the consistency with which chemistry lecturers/teachers stick to old ways of doing things, Infact they have so much refuse ICT to the extent that they are gradually becoming custodians of cultural heritage and as such become blind to innovation, novelty and current information on better means of carrying out chemical reactions that is friendly to the environment (i.e. green chemistry). Accessibility to useful chemicals that would have helped chemist blend with the current trend in the field of chemistry researches has equally eluded the Nigerian Chemistry lecturers/teachers due to their non-challant attitude.

### **The Way Forward**

The following suggested remedial actions though not exhaustive will help to ameliorate the pitfalls being experienced in the contribution of ICT to chemistry education development in Nigeria.

### **Mobilization and Sensitization of Chemist**

The government and other policy makers especially in chemistry education should be adequately oriented and sensitized to organize a capacity building training and workshop for chemistry lecturers/teachers and following it up by adequately equipping all chemist with at least a laptop computer that will serve as a tool for them to function effectively in nation’s bid to maximize the impact of ICT on chemistry education and make Nigeria a global village indeed.

### **Periodic Training and Retraining of Chemist**

Chemist should make a conscious effort to ensure that they attend capacity building workshops and seminars on periodic basis to update their knowledge and enable them to swim along

with the global trend of events in their field. Institutions can in the interim adopt an approach whereby they send one or two chemist depending on the availability of fund to a workshop of international standard, so that when they return, they will in turn impact the acquired knowledge and skills to their colleagues. Also government should make it a priority to sponsor chemist on ICT based conferences if its pronouncement of making Nigeria one of the top twenty (20) economies come 2020 is not yet another chase after the wind.

#### **Rational/Realistic Government Policies**

Government should ensure that its policies as it relates to ICT in Science education and chemistry education in particular are realistic, attainable and rational. Government should also put in place a machinery to ensure a continuity of policies and programmes because experience has shown that Nigerian government is good in being quick to adopt any new policy and not wasting time in dumping same especially with the exit of an administration. For instance, the Mrs. Chinwe Obaji's pronouncement of government plans to provide one laptop each for every Nigerian child of school age never saw the light of the day, and that beautiful idea was immediately buried after her tenure as a minister of education. The nation's policy makers in the educational sector should do away with sentiment and ensure that laudable projects of their predecessors are pursued to the latter for the sake of the future generation.

#### **Adequate Monitoring and Supervision**

There should be a monitoring and supervisory team to work hand in hand to ensure that the facilities meant to catalyze Nigeria chemistry to global limelight using ICT set up by government are adequately supervised and monitored as government cannot afford to let such a laudable and future promising project (ICT in chemistry education) if put in place to die like any other project in Nigeria educational sector. The team should be saddled with the responsibility of supervising, monitoring and reporting back to stakeholders' areas where adjustment or amendment needs to be done. Such individuals should not be corrupt, witch hunting or incompetent in the discharge of these great responsibilities. In other words they should be people of integrity, people who are objective to the core with a high credibility should be selected to do this job of monitoring and supervision if we are to get to the promise land in our global movement using the vehicle of ICT.

#### **PHCN Syndrome**

When the then Obasanjo regime promised to make electricity supply something to be taken for granted at the inception of the administration, Nigerians were full of hope and of a very high expectation, the expectation and hopes of Nigerians got to its peak when the name of the service provider was changed from National Electric Power Authority (NEPA) to Power Holding Company of Nigeria (PHCN) as if that was what would bring an end to power problem in the country. But before the end of Obasanjo's administration, it has dawned on Nigerians that the problem has only changed name and not been solved.

It is evidently clear that power supply, which is the fuel that would drive ICT implementation in chemistry education has, remain a problem that has defiled all solutions. The present administration also promised at its inception to declare a state of emergency in the power sector, and went further to state that "it is not a promise but a mandate" that the administration will keep to its promise and eventually make power supply a reality. Nigerians are still waiting for its manifestation, however solar

energy can be adopted in the interim to ameliorate the problem pending when the situation will improve.

### **Conclusion**

No nation attains global independence and maintains a buoyant economy, if its scientific and technological development are not given a serious attention.

Though Nigeria's intention of becoming one of the twenty most developed economy by 2020 will be scuttled, if adequate plans that will ensure an ICT driven education is not properly conceptualized and implemented. However, chemistry that is well known for its developmental attributes would add more values and relevant global challenges if its curriculum allows for ICT intervention.

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