Standardization of Education in Nigeria through Information Communications Technology (ICT)

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Abstract
Academic institutions in many countries of the world, both public and private, have suffered socio-economic degradation over the years and more so, in developing countries like Nigeria where provision of adequate educational facilities and infrastructure to attain standards in education has been a battle. There is great need for common core standards in education to replace state standards in order to create a healthy platform for placing Nigeria in the global education scale. One thing is to set up a standard, and another is the attainment. Inadequate provision of books and other professional materials in school libraries had been a major setback to Nigerian researchers over the years until the emergence of ICT (Information Communications Technology) which not only provides access to books and other scholarly articles but also serves as a pointer to such resources in a rather overwhelming fashion. This paper highlights the need for educational standardization at all levels and projects ICT as the tool in solving the problem of variation in educational standards in various localities throughout the country.

Keywords: Education, Pedagogy, Standardization, ICT, Infrastructure

Introduction
Standardization, according to the encyclopedia, is the process of developing and implementing technical standards. The aim of standardization is to maximize compatibility, interoperability, uniformity, or quality and hence promote safety and security. In other words, standardization involves setting up a framework or platform of agreements to which all relevant parties in an industry or organization must adhere to ensure that all processes associated with the creation of a good or performance of a service are performed within set guidelines in such a way that the end results are comparable with all other equivalent elements in the same class. This paper tries to point out that ICT plays a key role in achieving standardization in the education sector.

Standards and Standards Organizations
The importance of standardization of products, systems, and services has led to the formation of many standards organizations. There are many specifications that govern the operation and interaction of devices and software on the Internet, but they are rarely referred to as standards, so as to preserve that word as the domain of relatively disinterested bodies such as International Standards Organization (ISO). The World Wide Web Consortium (W3C), for example, publishes "Recommendations", and the IETF publishes "Requests for Comments" (RFCs). However, these publications are sometimes referred to as standards.
In the context of information exchange, standardization refers to the process of developing standards for specific business processes using specific formal languages. These standards are usually developed in voluntary consensus standards bodies such as the W3C, the Telecommunications Industry Association (TIA), and the Organization for the Advancement of Structured Information Standards (OASIS). The focus of this paper is to give ICT its proper place in standardization of business, government, industry, and in particular, the academia (fig. 1).

![Diagram showing the place of ICT in academia]

**Fig. 1: The place of ICT in academia**

**Importance of Standards**

Educational Standards simply refer to expectations for schools, students, educators and school officials. The popular rhetoric of educational reform is increasingly coloured with the terminology of standards as public policy views shift from an exclusive focus on inputs into schools--such as grants allocated, curricula produced, pupil-teacher ratios, and teacher qualifications--to consideration of outcomes, such as student achievement, graduation rates, and drop-out rates. At one time, standard-setting—the process of defining points for educational decision-making was primarily of interest to measurement specialists and psychometricians. Now on both the national and provincial levels, educational administrators and policy-makers are engaging both educators and non-educators in formal exercises to define acceptable and/or desirable levels of student performance for the school system. As such, the process of setting educational standards can be seen from a number of perspectives.

Standard-setting can be viewed as a:

- Forum where the match between what educators intend to do and what they actually have done is deliberated,
- Intersection where educational ideals meet reality,
- Exercise which gives voice to the underlying appreciative knowledge of professionals and nonprofessionals about the potential for youth,
- Evaluative process for placing an interpretative framework around assessment data in either statistical and textual form,
- Due process mechanism for adjudicating outcomes for a school system,
- Psychometric technique for calibrating test questions,
- Means for applying social meaning to measures of learning,
- Instrument for clarifying professional and public expectations about curricular and instructional effectiveness,
Public policy arena where competing stakeholder interests and values are drawn together and reconciled to define education system outcomes for public accountability purposes, or

Decision-making process which in turn establishes points for further educational decision-making.

Because it both represents and reflects diverse values about what we think important in education, a standard is often subject to controversy (Hambleton & Powell, 1983). Virtually all scholars concur that standard setting is a judgmental exercise. A standard therefore can only as good as the judgments and evaluative processes used in setting it. Popham (1978a) has argued that serious standard-setting which relies, “on decent collateral data, wide-ranging input from concerned parties, and systematic efforts to make sense out of relevant performance and judgmental data is not capriciously arbitrary. Rather, it represents the efforts of human beings to bring their best analytic powers to bear on important decisions” (p. 169).

What are academic standards?
Academic standards describe the public goals of schooling, the destinations at which students should arrive at the end of the unit or term. For example, most standards expect students graduating from high school to be able to write for different audiences in different formats -- things such as reports, instructions, literary criticism, and persuasive and reflective essays -- and to demonstrate a command of standard written English. Note that the standard doesn't prescribe how to get the students to this destination -- that is determined by the curriculum. Standards do not prescribe any particular curriculum: National standards don't mean that local ability to choose teaching materials and methods are compromised. Standards indicate what students should know and should be able to do at various levels. The teacher can choose whatever curriculum he or she finds appropriate to help the students meet the standards. Standards are the WHAT of education while curriculum and instruction are the HOW.

Two kinds of standards are referred to -- content standards and performance standards. Content standards indicate what students should know and should be able to do. For example, students should be able to write and speak for a variety of purposes and for diverse audiences, using conventional grammar, usage, sentence structure, punctuation, and spelling. A performance standard measures how well a student's work meets the content standard. A performance standard has levels (4, 3, 2, and 1; or advanced, proficient, novice, and basic) and frequently examples of student work are provided for each level. Performance standards are essentially the same as rubrics. Rubrics describe what student work must consist of to get a certain score. Rubrics or performance standards list one of the characteristics of student work -- for example, problem-solving in mathematics or persuasive writing in English/language arts. All examples of problem-solving or persuasive writing, no matter what the topic, should contain these characteristics (Educational Broadcasting Corporation, 2004).

Curriculum Standardization
The term curriculum refers to the lessons and academic content taught in a school or in a specific course or program. In dictionaries, curriculum is often defined as the courses offered by a school, but it is rarely used in such a general sense in schools. Depending on how broadly educators define or employ the term, curriculum typically refers to the knowledge and skills students are expected to learn, which includes the learning standards or learning
objectives they are expected to meet; the units and lessons that teachers teach; the assignments and projects given to students; the books, materials, videos, presentations, and readings used in a course; and the tests, assessments, and other methods used to evaluate student learning. An individual teacher’s curriculum, for example, would be the specific learning standards, lessons, assignments, and materials used to organize and teach a particular course.

States, districts, and schools may also try to improve teaching quality and effectiveness by requiring, or simply encouraging, teachers to use either a standardized curriculum or common processes for developing curriculum. While the strategies used to promote more standardized curricula can vary widely from state to state or school to school, the general goal is to increase teaching quality through greater curricular consistency. School performance will likely improve, the reasoning goes, if teaching methods and learning expectations are based on sound principles and consistently applied throughout a state, district, or school. Curriculum standards may also be created or proposed by influential educational organizations—such as the National Science Teachers Association or the National Council of Teachers of Mathematics, for example—with the purpose of guiding learning expectations and teaching within particular academic disciplines.

Standardization Considerations
a. Examination of the explanatory power of theories, assuming the global spread of standard models of educational provision and organization.
b. Identification of the complex interplay between the necessity to ensure excellence, on the one hand, and the preservation of cultural traditions, on the other hand.
c. Provision of policy-oriented information for policy makers at both the public and firm level on the implementation of reforms in all areas of education and training that both meet the challenges of global transition and preserve cultural identities while assuring high levels of excellence.
d. Provision of common and open access platform to the agreed upon standards which is proffered by ICT.

A reflection on Nigeria Education System
Nigeria is among the states with the highest rates of out-of-school children in the world, according to the Global Monitoring Report (GMR).
Despite the fact that Nigeria joined the Global Partnership for Education in 2012 and received a grant of US$100 million in December 2014 to boost its educational system, the situation doesn’t get better. The report stated that the main reasons why Nigeria still lacks progress in this field are corruption, lack of investment in education and continuing conflict in the northeastern part of the country.

Education spending in Nigeria and its influence on the economy
According to Olawale Rotimi, spokesman to Kwara state speaker and editor of the AGES magazine, the current state of Nigeria’s education is not satisfactory. It’s of low quality and standard, limited in reach and its future seems disturbing. At the same time it’s commonly acknowledged that education brings social, economic, political and security benefits to any individual, society or country. All over the world education is considered a vital instrument to economic prosperity, disease combating, poverty tackling and sustainable development.
Fall in education standards in Nigeria is connected to poor government spending on Nigerian institutions and excessive spending on the foreign ones. Apparently, the budgetary allocations to education sector in Nigeria have always been inadequate to meet the demands of the sector. Theoretic and empirical evidences support primary role of public education expenditure in ensuring rapid and persistent economic growth. However, available statistics does not seem to support this point of view. Between 1970 and 2010 about 5.72% of public funds were spent on education. This is very discouraging and, as a result, during the same period, economic growth was inconsistent and averaged 0.6 per cent (Naij.com news).

Standards-based Education Reform in the United States
Education reform in the United States since the 1980s has been largely driven by the setting of academic standards for what students should know and be able to do. These standards can then be used to guide all other system components. The SBE (standards-based education) reform movement calls for clear, measurable standards for all school students. Rather than norm-referenced rankings, a standards-based system measures each student against the concrete standard. Curriculum, assessments, and professional development are aligned to the standards.

Best Education in the World: U.S. Rated Average
The United States places 17th in the developed world for education, according to a global report by education firm Pearson. Finland and South Korea, not surprisingly, top the list of 40 developed countries with the best education systems, followed by Hong Kong, Japan and Singapore. The rankings are calculated based on various measures, including international test scores, graduation rates between 2006 and 2010, and the prevalence of higher education seekers. Pearson's chief education adviser Sir Michael Barber tells BBC that the high ranking countries tend to offer teachers higher status in society and have a "culture" of education. The study notes that while funding is an important factor in strong education systems, cultures supportive of learning is even more critical-as evidenced by the highly ranked Asian countries, where education is highly valued and parents have grand expectation. While Finland and South Korea differ greatly in methods of teaching and learning, they hold the top spots because of a shared social belief in the importance of education and its "underlying moral purpose." The study aims to help policymakers and school leaders identify key factors that lead to successful educational outcomes. The research draws on literacy data as well as figures in government spending on education, school entrance age, teacher salaries and degree of school choice.

The report also notes the importance of high-quality teachers and improving strong educator recruitment. The rankings show, however, that there is no clear correlation between higher pay and better performance. The bottom line findings:

1. **There are no magic bullets:** The small number of correlations found in the study shows the poverty of simplistic solutions. Throwing money at education by itself rarely produces results, and individual changes to education systems, however sensible, rarely do much on their own. Education requires long-term, coherent and focused system-wide attention to achieve improvement.

2. **Respect for teachers:** Good teachers are essential to high-quality education. Finding and retaining them is not necessarily a question of high pay. Instead, teachers need to be treated as the valuable professionals they are, not as technicians in a huge, educational machine.
3. **Culture can be changed:** The cultural assumptions and values surrounding an education system do more to support or undermine it than the system can do on its own. Using the positive elements of this culture and, where necessary, seeking to change the negative ones, are important to promoting successful outcomes.

4. **Parental support:** Parents want their children to have a good education; pressure from them for change should not be seen as a sign of hostility but as an indication of something possibly amiss in provision. On the other hand, parental input and choice do not constitute a panacea. Education systems should strive to keep parents informed and work with them.

5. **Educate for the future, not just the present:** Many of today's job titles, and the skills needed to fill them, simply did not exist 20 years ago. Education systems need to consider what skills today's students will need in future and teach accordingly.

**Impact of ICT on Education**

ICT (information and communications technology), according to Wikipedia, the free encyclopedia, is often used as an extended synonym for information technology (IT), but is a more specific term that stresses the role of unified communications (Murray, James 2011-12-18) and the integration of telecommunications (telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information (“Information and Communication Technology from”. FOLDOC. 2008-09-19). It can also be viewed as a term that includes any communication gadget or application, which could be radio, television, cellular phones, computer and network hardware and software, satellite systems etc, including the associated applications and services.

**Impact on students’ achievement**

1. **Positive impact more likely when linked to pedagogy:** It is believed that specific uses of ICT can have positive effects on student achievement when ICTs are used appropriately to complement a teacher’s existing pedagogical philosophies.

2. ‘Computer Aided Instruction’ has been seen to slightly improve student performance on multiple choice, standardized testing in some areas. Computer Aided (or Assisted) Instruction (CAI), which refers generally to student self-study or tutorials on PCs, has been shown to slightly improve student test scores on some reading and math skills, although whether such improvement correlates to real improvement in student learning is debatable.

3. **Need for clear goals:** ICTs are seen to be less effective (or ineffective) when the goals for their use are not clear. While such a statement would appear to be self-evident, the specific goals for ICT use in education are, in practice, are often only very broadly or rather loosely defined.

4. **ICTs use in different school subjects:** Uses of ICTs for simulations and modeling in science and math have been shown to be effective, as have word processing and communication software (e-mail) in the development of student language and communication skills.

5. **Users believe that ICTs make a positive difference:** In studies that rely largely on self-reporting, most users feel that using ICTs make them more effective learners.
Impact on student motivation

1. **ICTs motivate teachers and students:** There appears to be general consensus that both teachers and students feel ICT use greatly contributes to student motivation for learning.

2. **Access outside of school affects user confidence:** Students who use a computer at home also use them in school more frequently and with more confidence than pupils who have no home access.

3. **Where to place computers has an impact:** Placing computers in classrooms enables much greater use of ICTs for ‘higher order’ skills than placing computers in separate computer laboratories (indeed, fewer computers in classrooms may enable even more use than greater numbers of computers located in separate computer labs). Related to this is an increasing attention given to the use of laptops by both teachers and students (and in some places, ‘computers-on-wheels’), as well as, to a much lesser extent, to the use of personal digital assistants and other mobile devices.

4. **Models for successfully integrating ICT use in school and after school hours are still emerging:** There are few successful models for the integration of student computer use at home or in other ‘informal settings' outside of school facilities with use in school.

5. **The appropriate ages for introducing computers to students are hotly debated:** On a general level, appropriate ages for student ICT use in general are unclear. However, it is clear that certain uses are more or less appropriate, given student ages and abilities. Emerging research cautions against widespread use at younger ages.

6. **Learner autonomy:** Evidence exists that use of ICTs can increase learner autonomy for certain learners.

The Need for ICT in Education Standardization

An effective teacher must study the science of pedagogy and instructional design before entering the classroom. Pedagogy is the science and art of education, specifically instructional theory. It is simply defined as many different types and variations of teaching. As such, there are various ways in which students learn and teachers teach. Some of these ways are inclusive of discovery learning, group learning, hands on learning, distance learning, and independent study. ICT is powerful in presenting or representing information in different ways. This can be through different forms (text and pictures or tables and graphs) or by enabling changes to be shown dynamically such as in mathematical modeling or by helping visualization of complex processes in science.

Observing changes in a graph when changes are made to the table of numerical information on which the graph is based or by manipulating an algebraic formula and observing how a graph of that function changes on a computer or graphical calculator can develop pupils’ understanding of mathematical relationships.

Computer tools can help students or teachers manipulate complex data-sets. This then provides a context for effective discussion which in turn can help to develop mathematical understanding (Cobb and McClain, 2002). ‘Visualization tools’ can help learners to picture scientific ideas (Jonassen, 2000) or to develop conceptual understanding. (See figures 2a and 2b).
This paper highlights the need to place ICT at the center of education not only as a tool to transform teaching and learning process but also as a sure means to standardize education both nationally and globally by setting up proper standards and unifying it by creating open access framework to common academic curricula, giving room for central accreditation, performance evaluation and certification.

Why education standard is falling. (2013, July 31). ‘The dwindling standard of education in Nigeria has been attributed to lack of adequate commitment by those who are charged with the responsibility to impart knowledge through qualitative teaching, as well as the attitude of government towards proper funding of education as required by the United Nations standard’. The Chairman, Governing Council, Diadem Group of Schools, Mr. Olapoju Oladinni, who made this observation stated that both the teaching staff at all levels of our educational system and the government are shaking in their respective responsibilities towards providing and maintaining good standard of education for our children. Retrieved from http://www.vanguardngr.com/2013/07/why-education-standard-is-falling/

**ICT in the Practice of Instructional Design**

In the profession of teaching, instructional design is just as important as pedagogy. In fact one influences and shapes the other. Instructional Design (also called Instructional Systems Design (ISD)) is the practice of creating "instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing. The process consists broadly of determining the current state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in the transition. Ideally the process is informed by pedagogically (process of teaching) tested theories of learning and may take place in student-only, teacher-led or community-based settings. The outcome of this instruction may be directly observable and scientifically measured or completely hidden and assumed. There are many instructional design models but many are based on the ADDIE model with the five phases: Analysis, Design, Development, Implementation, and Evaluation. This paper presents ICT as the facilitator of the five phases.

According to Gagné, learning occurs in a series of learning events (fig.3). Each learning event must be accomplished before the next in order for learning to take place. Similarly, instructional events should mirror the following learning events: gaining attention, informing learners of objectives, stimulating recall of prior learning, presenting the stimulus, providing learning guidance, eliciting performance, providing feedback, assessing performance, and enhancing retention and transfer.
A reflection on Gagne’s instructional theory reveals nine events of instruction, one could see that visual aids do great in each event and these can be effective on application of ICT.

**A Scenario for Education standardization through ICT**

In simple terms, to standardize means to change (things) so that they are similar and consistent and agree with rules about what is proper and acceptable, such that it fits a certain guideline or requirement. Test of attainment of standards in education should not just be based on computer based performance test scores but also practical tests of autonomy, mastery, and purpose on the paths of both the teacher and the taught, which results in making the students possess creative ability and find relevancy and meaning in their learning.

In United Kingdom for example, the National Curriculum was introduced into England, Wales and Northern Ireland as a nationwide curriculum for primary and secondary state schools following the Education Reform Act 1988. Notwithstanding its name, it does not apply to independent schools, which may set their own curricula, but it ensures that state schools of all local education authorities have a common curriculum. Academies, while publicly funded, have a significant degree of autonomy in deviating from the National Curriculum. The purpose of the National Curriculum was to standardise the content taught...
across schools to enable assessment, which in turn enabled the compilation of league tables detailing the assessment statistics for each school. These league tables, together with the provision to parents of some degree of choice in assignment of the school for their child (also legislated in the same act) were intended to encourage a 'free market' by allowing parents to choose schools based on their measured ability to teach the National Curriculum.

In my own opinion, there is need to spell out common core requirements at all levels of education throughout Nigeria which must have been made to fit into the global education standard. With the requirements at each level of education placed online such that it is accessible to all concerned as depicted in figure 3.

Fig. 4: A scenario for Education standardization through ICT

Diagram (fig. 4) Description
The figure covers every level in education from crèche to tertiary and proffers information as applicable to each level.
Instructional design: The practice of creating "instructional experiences which make the acquisition of knowledge and skill more efficient, effective, and appealing." The process consists broadly of determining the current state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in the transition.

Pedagogy: It is simply defined as many different types and variations of teaching.

Learning design is the practice of planning, sequencing and managing learning activities, usually using ICT-based tools to support both design and delivery.

Applications: This is concerned with areas where what has been learnt could be applied.

Standards-based Education
Standards-based education is the process of teaching, learning, and assessment that focuses on national, state, and local educational standards.

Academic content standards are statements of what students are expected to know and be able to do at specified grade levels. Standards serve several important functions and roles which include:

What to Teach
Standards serve as beginning points for teachers when they make decisions about what to teach.

Increased Achievement
Standards focus on essential concepts, knowledge, skills and behaviors necessary for students to succeed in the 21st century. As such, they are designed to increase achievement.

Meeting Needs of Low Achieving Students
Because standards clearly address what all students should learn, and each school’s responsibility in that effort, they can be used as a means of preventing school failure and dropout rate.

Increased Accountability
As standards become the basis for teaching and testing, schools are evaluated on and recognized for how well students perform on local and state tests, and on theoretical and practical tests.

Increased State and Federal Responsibility
Constitutionally, education is a state responsibility. Historically and traditionally, states have delegated much of the responsibility for education to local school districts. With standards, the state now plays a much more prominent role in educational affairs.

Conclusion
One thing is to set up a standard, while another is the attainment. There is a close tie between education standards, curriculum and teaching practice because the purpose of curriculum and the method of teaching are geared towards achieving the set goals already setup by the standards. Since teachers teach based on the curriculum and according to the level of their knowledge or expertise, teacher capacity building especially through ICT is of essence as several studies have shown that the classroom pedagogy used by teachers is consistently seen as the crucial variable for improving learning outcomes, and more so when integrated with ICT. Effective use of ICT as a central tool for teaching and learning process in Nigeria and beyond is a sure means of standardization of education which can speed up the economic development of a country in the current rapidly changing, technology-driven, data-driven world, where ICT is one of the basic building blocks of a modern society. It is, therefore, important to properly realign the orientation of ICT in both teacher and student education, to support sustainable...
and standardized education focusing on learning to learn and learning to live-together habits, especially in a country like Nigeria where the government has envisioned the need for entrepreneurship and self reliance.

**Recommendations**

In places like Nigeria, both state and federal governments have endeavoured to include practical ICT training programs in education curriculum by equipping academic institutions with internet facilities and consequent e-library for effective and up-to-date learning. Alternative power supplies should also be made available in school laboratories. The government should deploy commensurate resources to develop Nigeria’s education system through provision of adequate ICT infrastructure, followed by proper maintenance strategy so that the infrastructure already in place would always be made functional. Effort has quite been made in many institutions to set up internet facilities and digital libraries in Nigeria with limited provisions of accessible learning materials. It is important that awareness on the path of the students be made for them to know that the internet access in their mobile devices is a form of digital library which could be explored and accessed almost unlimitedly. The ability to attain already setup education standard is dependent on the level of expertise of the teachers and this calls for capacity building on the path of the teachers which is easily achievable through ICT.

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