# ICT Literacy Policy - BOTSWANA

## Study and Report by Botswana IFAP Committee

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**Dimane Mpoeleng, Ph.D.  (Botswana IFAP SEAT HOLDER)**
Computer Science and Information Systems
B.I.U.S.T
Bag 16, Palapye, BOTSWANA
+267 493-1112 (office)
+267 72972059 (Mobile)
mpoelengd@biust.ac.bw

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# Botswana IFAP Committee Members

| | | |
|---|---|---|
| **Dr. Dimane Mpoeleng, Ph.D. (IFAP Seat Holder) mpoelengd@biust.ac.bw** | | **BIUST** |
| Dr. Jeff Ramsay, Ph.D | jramsay@gov.bw | Office of the President |
| Ms Barbara.gotlop | barbara.gotlop@mascom.bw | Mascom Wireless |
| Ms Carol Kgafela-ORANGE | carol.kgafela@orange.com | Orange Botswana |
| Ms Segolame Motlhagodi, | skmotlhagodi@gov.bw | Botswana E-Government Office |
| Ms Setoki Maseko | semaseko@gov.bw | UNESCO Botswana, under MoESD |
| Ms Tirelo Ramasedi, | tirelo.ramsedi@bih.co.bw | BIH |
| Mr Cecil Masiga, | cmasiga@gov.bw | DIT |
| Mr Ephraim Balebeste, | ebalebetse@gov.bw | Ministry of Transport& Communication |
| Mr Golekanye Molapisi, | golekanye@btc.bw | BTCL |
| Mr Keletso Nyelesi, | nyelesi@bocra.org.bw | BOCRA |
| Mr Lesego Masole, | lesego@bofinet.co.bw | BOFINET |

# List of acronyms

| | |
|---|---|
| BAC | Botswana Accountancy College |
| BEC | Botswana Examinations Council |
| BIH | Botswana Innovation Hub |
| BIUST | Botswana International University of Science & Technology |
| BOCODOL | Botswana College of Distance and Open Learning |
| BOCRA | Botswana Communications Regulatory Authority |
| Bofinet | Botswana Fibre Networks Ltd |
| BotsNet | Botsnet Broadband Solutions |
| BQA | Botswana Qualifications Authority |
| BTCL | Botswana Telecommunications Corporations Limited |
| BU | Botho University |
| CSO | Central Statistics Office |
| IFAP | Information for All Programme |
| HRDC | Human Resource Development Council (former TEC) |
| MFDP | Ministry of Finance and Development Planning |
| MIST | Ministry of Infrastructure, Science and Technology |
| MoESD | Ministry of Education and Skills Development |
| TEC | Tertiary Education Council (now HRDC) |
| UB | University of Botswana |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |

# Background

The intergovernmental Information for All Programme (IFAP) was established in 2001 as the successor to the General Information Programme (PGI) and the International Informatics Programme (IIP). As an Intergovernmental Council comprised of experts from 26 Member States elected by the General Conference on the principle of geographical representation, IFAP provides a platform for international policy discussions, cooperation and the development of guidelines for action in the area of access to information and knowledge. It is a programme of UNESCO that provides a platform for international policy discussions and guidelines for action on preservation of information and universal access to it, participation of all in the emerging global information society, ethical, legal and societal consequences of Information and Communications Technology (ICT) developments. The programme also provides financial support for projects that, promote information, literacy, promote universal access to the Internet, and strengthen the role of libraries and archives in preserving information, including digital materials.

Information and knowledge constitutes a global public good and is essential to the advancement of education, science, culture and communication, to empowerment, to the promotion of cultural diversity and to fostering open governance. As stated in its Constitution, UNESCO is dedicated to "promoting the free flow of ideas by word and image". UNESCO has the mandate to "maintain, increase and diffuse knowledge" by ensuring the "conservation and protection" of the world's recorded knowledge. Furthermore, the Organization shall encourage "co-operation among nations… in the exchange of publications" and other information materials and initiate "methods of international cooperation calculated to give the people of all countries access to printed and published material produced by any of them".

In order to grasp the opportunities offered by ICTs to fulfill this mandate, UNESCO has established the Information for All Programme. It seeks to narrow the gap between the information rich and the information poor and thus to build an information society for all. It is a platform for international policy discussions and programme development aiming at the:

- better understanding of the ethical, legal and societal consequences of ICTs;
- improvement of access to information in the public domain;
- preservation of information.

At the 8th session of the Intergovernmental Council for the Information for All Programme in 2014, Botswana was given a role to establish a national ICT literacy policy as a template for other IFAP member states. Therefore the committee felt for a well-informed ICT literacy there is a need for a comprehensive study of the *status quo* of the country's ICT related education.

Information literacy and lifelong learning have been described as the beacons of the information society, illuminating the courses to development, prosperity and freedom.

Information literacy empowers people in all walks of life to seek, evaluate, use and create information effectively to achieve their personal, social, occupational and educational goals. Information-literate people are able to access information about their health, their environment, their education and work, and to make critical decisions about their lives.

In a digital world, information literacy requires users to have the skills to use information and communication technologies and their applications to access and create information. Closely linked are two other related literacies: computer literacy (ICT skills) and media literacy (understanding of various kinds of mediums and formats by which information is transmitted). For example, the ability to navigate in cyberspace and negotiate hypertext multimedia documents requires both the technical skills to use the Internet and the literacy skills to interpret the information.

IFAP is promoting actions aimed at raising awareness of the importance of information literacy and supporting projects that build the literacy skills of users.

## Objectives

The main objectives of the Botswana ICT Literacy Project are:

- **Identify** current Botswana ICTs in education environment and practices
- **Review** the current country Education Policies and Literature that focus on ICT Literacy and ICT in Education.
- **Identify** Botswana practices of ICT in Education
- **Compare** the Botswana practices on the use of ICT in Education with global practices
- **Summarize** the study findings
- **Highlight** gaps, strength and opportunities of Botswana ICT Literacy
- **Recommend the ICT Literacy Policy Framework, in** line with IFAP Information Literacy focus area of information literacy.
- the **UNESCO** Post-2015 Education agenda and Country's long term objectives of Education.

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## Challenges

Due to limited funds this report is based on desktop study we carried. There was not enough fund to intensively cover a wide range of issues in breadth and depth required. Various institutions and stake holders around the country could not be physically visited.

Further other IFAP member states could not be visited to drive the Information literacy agenda or workshops.

We look forward to applying for financial support from potential donors to support our 2016-2017 activities.

# Preface

Over the past 50 years since independence from Great Britain, Botswana has enjoyed the status of one of the fastest growing economies in the world. This growth has elevated Botswana from being among the poorest countries in the world to a middle income economy. But IMF projects the county's economy will decrease from peak growth of double digits to a cautious 4.8% by 2017, IMF (2014). Despite her economic phenomenon Botswana is still faced with challenges such as high unemployment especially among the youth, poverty and wealth, inequality being among the worst in the world. Economic diversification efforts on diamond exports and processing have been challenged and even more worrying is the gloomy picture painted by diamonds production experts who anticipate a gradual deterioration over the next 20 years. To tackle this, Botswana is allocating more resources to a knowledge driven economy. At the center of this drive are heavy investments tied to National Development Plans on education driven policies and vision such as the Vision 2016 and beyond. The set target is that by 2016 the country should have joined the ranks of high income, knowledge-based economies.

Through education, a skilled workforce is to be developed to support and manage the various sectors in the economy, thereby contributing to wealth creation and distribution as the basis for modernization and development. These efforts are faced with challenges that are geographic, social, economic and expensive infrastructural development is a major challenge. As one of the worst sparsely populated countries in the world, with only a population of 2 million on a 581,730 square kilometer of land, any infrastructural development requires heavy investment. Be it building of roads, schools, service centers, telecommunication networks, travel and training. Therefore an education policy and strategy that reflect all these challenges is essential.

The National Policy on Education (1977) and the Revised National Policy on Education (RNPE 1994) are consistent with the Vision 2016 and National Development Plans and have provided the policy framework for the education system in Botswana. These two policies were anchored around five principles: democracy, development, self-reliance, *botho* and unity. To ensure the realization of the policies objectives, there is a need for an education strategic plan on education. Thus the Education and Training Strategic Sector Plan (ETSSP) was conceived. The ETSSP is a five year medium term strategy from 2015 to 2020 designed to comprehensively and fundamentally transform education from pre-primary to tertiary level. It is in line with the national education priorities that influenced the framing of the African regional education priorities. The ETSSP puts a significant emphasis on the use of ICTs in education and the Botswana government has linked the strategy to budget.

This study has compiled a documentation on good practices and cite lessons learned in the use of ICTs in education at different levels from early childhood, primary, secondary, higher education, inclusion, and adult literacy and covers both formal and non-formal education. In this study real questionnaires surveys on the use of ICTs in education were conducted in some primary schools, junior secondary schools, and senior secondary schools across Botswana.

Finally the report recommends a framework for ICT Education Literacy as template by other Sub-Saharan IFAP member states.

# 1.     Introduction

United Nations (UN) has declared Education as a fundamental human right in itself as well as an enabling right, fostering the accomplishment of all other social, cultural, economic, civil and political rights.  This section puts in context, Botswana's obligation on international charters on education in terms of how her own education policies relate to UNESCO's issues on ICTs and Education.

Botswana IFAP committee role is focused on IFAP *Area 2: Development of human resources and capabilities for the information age:*

- • International framework for ensuring basic literacy and ICT literacy established;
- • ICT-based training networks for information specialists in all regions established;
- • Framework for cooperation and information exchange about the content and quality of training in the information area established;
- • Introduction of e-publishing and e-commerce training activities for publishers and producers.

## 1.1     Botswana's mandate to UNESCO education policy agendas

Botswana has an established Permanent Delegates to UNESCO headed by Ambassadors who undertake liaison between the Organization and Botswana.  She has established a National Commission for UNESCO. The UNESCO National Commissions are national cooperating bodies set up by the Member States for the purpose of associating their governmental and non-governmental bodies with the work of the Organization. Botswana subscribed to the UNESCO constitution for the purpose of advancing, through the educational and scientific and cultural relations of the peoples of the world, the objectives of international peace and of the common welfare of mankind.

## 1.2     UNESCO 37 C/5 2014–2017 Volume 1 Draft Resolutions

The 37 C/4 and 37 C/5 documents (2013) are an opportunity for Member States to define a common strategic vision for the Organization for eight years (2013-2021) and the century ahead. It is meant to refine UNESCO's role and enhance its impact and delivery. The draft's first Strategic Objective is "Developing education systems to foster quality lifelong learning opportunities for all" with emphasis on promoting information and communication technologies (ICTs) in education to improve access to knowledge, facilitate its dissemination and ensure more effective learning. So crucial is the use of ICTs that UNESCO has a dedicated institute named UNESCO Institute for Information Technologies in Education (IITE) to promote cutting edge research and policy making in the area of ICTs in Education (*ICTs as enablers to pedagogy and andragogy*)  and ICT Education (*actual ICT subjects*). Lifelong learning is a central principle of the post-2015 education agenda. Flexible lifelong and life-wide learning opportunities should be provided through formal, non-formal and informal pathways, including by harnessing the potential of ICTs to create a new culture of learning.

## 1.3     The UNESCO Kigali Statement on Post 2015 Education

Ministers of education from Sub-Saharan Africa attended a conference on Education Post-2015 Kigali, Rwanda 9-11 February 2015 which was code named *The Kigali Statement*. During the conference the implementation of the Education All (EFA) was discussed and new education priorities were drawn. The ministers reaffirmed their commitment to the pursuit of quality education for lifelong learning as a fundamental human right and imperative for sustainable development, which must be unequivocally guaranteed to every child, youth and adult. During the conference, a snap shot of EFA status was taken and it was found that several countries do not have universal access in the first grade of primary education, while completion in primary education is only 67%; 35% at lower secondary and 17% at upper secondary. Enrollment at Technical Vocational Education and Training (TVET) in Sub-Saharan Africa is only 606 students

per 100,000 inhabitants, while only 636 students per 100,000 access higher education and adult literacy levels stand at 69 %.

The Ministers therefore called for new policies, strategies, and target setting to respond to the new priorities in the African context cutting across all levels of education, using an integrated approach for sustainable development. One of the recommendations by ministers was to encourage innovation in teacher education and pedagogical practice, including the use of new media and information and communication technologies (ICT) and distance education.

## 1.4    Botswana Revised National Policy on Education (RNPE) & Education for All National Action Plan

The Education System was reviewed in 1993 and a responsive policy called "The RNPE" was subsequently published in 1994. The goals of this education policy are to prepare Batswana for the transition from a traditional agricultural and diamond economy to the industrial knowledge economy. It further addresses issues of access, equity and improvement of the quality of education. The Dakar Framework for Action Education for All (EFA) - National Action Plan (NAP) for Botswana (EFA-NAP) was developed within the context of the existing Revised National Policy on Education (RNPE) that was approved by Parliament in 1994. Another major policy document that has contributed to the EFA-NAP is the Botswana Vision 2016 which was formulated in 1996 to guide the country's strategic planning and policy development.

## 1.5    Education and Training Sector Strategic Plan (ETSSP) (2015-2020)

Perhaps the most ambitious strategy on education and ICTs in Education is The Botswana Education and Training Sector Strategic Plan (ETSSP 2015-2020). The plan marks a significant milestone in Botswana's collective efforts as a nation to bring about a more diversified, knowledge-based economy. Through a planned and careful development of human capital, the ETSSP seeks to refocus education and training towards fulfillment of social and economic aspirations identified in the Revised National Policy on Education (RNPE), the National Development Plan, Vision 2016 and as well as the Millennium Development Goals. ETSSP Five Thematic programmes from early childhood to tertiary and vocational educations are:

- Lifelong Learning (**LLL**)
- Information and Communications Technology (**ICT**)
- Curriculum Development (**CD**)
- Human Resource Development (**HRD**)
- Education Management and Information System reform (**EMIS**)

## 1.6    Botswana IFAP ICT literacy Report

As mentioned, this study compiled a documentation on good practices and cite lessons learned in the use if ICTs in education at different levels from early childhood, primary, secondary, higher education, inclusion, and adult literacy and cover both formal and non-formal education.

The main objectives of this Botswana IFAP ICT literacy report are to:

- Identify current Botswana ICTs in education environment and practices
- Review the current country Education Policies and Literature that focus on ICT Education and ICT in Education
- Identify Botswana practices of ICT in Education
- Compare the Botswana practices on the use of ICT in Education with global practices
- Highlight gaps, strength and opportunities of Botswana ICT Literacy
- Make recommendations to IFAP Member states in line with IFAP ICT literacy agenda.

# 2.    Related ICT Literacy work

This section reviews relevant literature of ICT Literacy and ICTs as an enabler in Education. The literature includes published conference papers, journal papers, research reports, and more authoritative policies and documents were analyzed and summarized here. The literature is divided into three main areas:  Botswana ICT Literacy, Related ICT Literacys systems across the world, and authoritative literature on ICT use in education, Botswana key socio-economic indicators.

The literature is categorized into four main subsections:

1. ICT Literacy - Policies and Practices across the world related to this work
2. ICTs Education – The teaching of ICTs in education institutions
3. ICTs in Education – The use ICTs as facilitators in effective education delivery in other subject areas such as Mathematics and Science, Arts, Social Sciences Subjects, Business, Languages, Special Education, early childhood development, and to People Living with Disabilities (PLWD), and

## 2.1 ICT in Education

Before an in-depth review of relevant literature in ICT in Education, UNESCO's ICT in Education is presented. The Guide to Measuring Information and Communication Technologies (ICT) In Education by UNESCO-UIS (2009) clearly spells out guidelines on how to measure ICT in Education. This is the framework that will largely be used in this work for analyzing the effective use of ICT in education in Botswana. The Guide to Measuring Information and Communication Technologies (ICT) in Education represents a groundbreaking attempt to put in place internationally standardized concepts and indicator measurement specifications that will ensure consistent use and interpretation of ICT in education statistics among policymakers, statisticians, researchers, experts and statistical institutions across the world. The key UNESCO indicators on the effective use of ICT in Education are:

| Conceptual domains | Potential policy questions | Mapping of information requirements |
|---|---|---|
| Political commitment | Do countries have deliberate policies and incentives that constitute an enabling environment for ICT integration into their national education system? | Presence of national and/or education sector-specific policy, plan or regulatory framework for ICT implementation strategy |
| Infrastructure | To what extent do the schools in a country have access to ICT in support of teaching and learning process? | Quantity and quality of ICT facilities or related resources in schools for educational purposes |
| Teaching staff development | What proportion of teaching staff is adapting their competencies to an ICT-enabled instruction model or to teach ICT subjects? | Training and deployment of teachers to use ICT in education |
| Curriculum | Are countries introducing changes in their curriculum delivery using ICT, and to what degree are ICT taught as a subject? | Extent of integration of ICT into the curriculum |
| Usage | What are the nature and intensity of ICT use in schools? | Access to ICT in schools (as proxy measure for usage) |
| Participation, skills and output | What is the evolution in structure (all fields versus ICT fields) of the skills or outputs produced annually by national education systems? | Stock of learners trained in basic computer skills and/or graduated in generic and specific ICT-related fields of study |
| Outcomes and impact | Are ICT transforming education systems' performance or making a difference in:<br>■ improving conventional teaching and learning processes?<br><br>■ enhancing the quality of student performances?<br><br><br><br>■ expanding new skills supply for labour market?<br><br>■ enlarging lifelong learning opportunities?<br><br><br><br>■ managing educational institutions? | ■ Evidence of the reforming role of ICT in the traditional face-to-face education delivery systems (effects on curriculum delivery and contents)<br>■ Differential success rates of learners in schools with ICT assisted instruction versus students in schools with conventional pedagogy (as proxy measure for impact)<br>■ Increase in the number of computer literates and the range of ICT-related fields of study graduates (ISCDED 4, 5 and 6)<br>■ Increased enrolments in ICT-enhanced outreach or on-the-job training programmes and of certifications in new skills obtained by individuals outside the formal education system.<br>■ Increased presence of computers in educational administrations or increased use of computers for school management |

**Figure 2.1: UIS ICT in Education Indicators in *Guide to Measuring ICT in Education.* (©UNESCO-UIS 2009)**

The UNESCO UIS came up with 53 indicators of ICT Education for analysis, measurement and evaluation of effective Practices of ICT in Education and its impact.

## 2.2. ICT Literacy Policies and Practices in Europe

One of the most comprehensive policy and practices on ICT Literacy is the European consortium called SchoolNet. The European SchoolNet is a network of 31 European Ministries of Education, based in Brussels. The network constitutes of Ministries of Education, schools, teachers, researchers, and industry partners. As a not-for-profit organization, SchoolNet aims to bring innovation in teaching and learning in member country schools. The main innovative tools for pedagogy are ICT tools. Every month the School Net project produce comprehensive results findings of a particular aspect of ICT in Education. The survey are based on questions such as *How often are students engaged in collaborative work in the classroom*?, *The 'teacher effect' on the use of ICT in the classroom*, *How confident are teenagers in behaving safely and responsibly in an online environment*?, *To which extent does the frequency of ICT activities in the classroom differ by subject, grade and education track*?, *Does the type of ICT training teachers pursue matter*?, *What are students' opinions on the impact of ICT on learning*?, *To which extent do students use innovative tools and resources in the classroom*?

*Are 1:1 classes with school-provided laptops and tablets widespread?*

One to one (1:1) means one student with their own computer to use. Randomly selected teachers were asked if their school provided students in their class with a laptop for their own use. At grade 4 (i.e. around 9.5 years old), almost 20% of students are in a 1:1 class in Denmark, Ireland and Poland with an EU mean of 8%. At grade 8 (i.e. around 13.5 years old), more students are in 1:1 classes than at other grades – 21% on average in the EU – but they are heavily concentrated in Spain, Norway and Sweden, with, as at grade 4, a 'long tail' of countries where there are currently hardly any students in such classes.

It shows that relatively few students in Europe are in a 1:1 class and they are concentrated in a few countries and at specific higher grades. Students report limited use of their own laptops or tablets in teaching in learning other subjects. But good news is the percentage of students using their own computers increases with the level of education, with quite positive figures for grade 11 students. However these findings don't say anything about any impact on the outcome as results of good use of the devices. - http://www.eun.org – Retrieved 20th August 2015.

*What are students' opinions on the impact of ICT on learning?*

More than 70% of students at grade 8 and 11 either *agree* or *strongly agree* on the positive impact of ICT on a number of learning aspects, including their ability to **concentrate** on what they are learning, to **remember** and **understand** it, to work **collaboratively**, to learn **independently** and to **experience** an improved class atmosphere. The analysis also reveals that school heads are more enthusiastic than students and teachers about the impact of ICT on students' transversal and higher order thinking skills, and particularly on their motivation and achievement. But a non-negligible proportion of students, particularly in general education, still underestimate how using computers will help them in their lives as adults, in finding a job and in performing well at work. Also teachers, and to a larger extent head teachers, appear to be aware of the positive impact of ICT on students' skills, motivation and achievement. http://www.eun.org – Retrieved 20th August 2015.

*To which extent does the frequency of ICT activities in the classroom differ by subject, grade and education track?*

Students were asked how often they used a number of tools and resources in the classroom, using a 4-level scale ranging from 'never or almost never' to 'every day or almost every day'. between 50% and 78% of students at grade 8 never use computer simulations; data-logging tools; digital books and textbooks; exercise software, online quizzes and tests; multimedia production tools; broadcasting tools; or digital learning games and video games. Such percentages become even higher at grade 11, both in general and vocational education. The most frequently used tools at all grades are digital books and textbooks and multimedia tools, i.e. PowerPoint presentations and audio visual materials. In contrast, simulations and data-logging tools are very rarely used, with 73% to 80% of students at all grades never using them. Although PowerPoint presentations, e-books and e-textbooks and exercise software are increasingly being used by students during class at least once a month, other tools such as data-loggers and simulations, which are vital to make science learning interactive and engaging for students, are still very rarely used during lessons. http://www.eun.org – Retrieved 20th August 2015.

## 2.3 ICT Literacy Policies and Practices in Asia

For ICT Literacy Policies and Practices in Asia, focus is on the work done by UNESCO-UIS (2014) whose main aim was to carry out comparative analysis of ICT integration and e-readiness in schools across Asian countries. This survey used E-readiness as a framework for quantifying ICT in education, it looked at ICT in the national curricula, the infrastructure that support ICT Literacy, Teaching and Learning and ICT in education. The findings provided a comparative analysis of ICT integration across Asia, including countries in Central Asia, South and West Asia and East Asia, by looking at four specific types of data: i) use of ICT in policy and key curricular areas; ii) ICT infrastructure and its importance to integrating ICT-assisted instruction; iii) participation in programmes offering ICT; and iv) teaching and learning as they relate to ICT in

education. These data provided a snapshot of ICT access, as well as basic usage of ICT for education, across the vast region. Similarly this work offers specific areas to analyze in evaluating the impact of ICT use in Botswana education.

## 2.4 ICT Literacy Policies and Practices in the Caribbean and Latin America

There has been several surveys and report on ICT in Education in the Caribbean and Latin America. These include ICT in Education in Latin America and the Caribbean - A regional analysis of ICT integration and e-readiness UNESCO-UIS (2012) and Survey of ICT and Education in the Caribbean: A summary report, Based on 16 Country Surveys by Gaible, Edmond (2008). The UNESCO-UIS 2012 looked at the Caribbean and Latin American landscape of ICT Literacy using the same model used in Asia.

The analysis focused on the level of integration of different forms of ICT-assisted instruction, including both older forms of radio- and television-assisted instruction, as well as newer forms, including computer- and Internet-assisted instruction. The work also examined the status of the infrastructure needed for their integration—electricity for all forms of ICT-assisted instruction, learner-to-computer ratios and computer labs for computer-assisted instruction, as well as the prevalence of Internet connectivity for Internet-assisted instruction.

The data showed some patterns related to ICT in education in Latin America and the Caribbean. First, Caribbean countries (particularly Anglophone – Those speaking English) have much higher integration levels of ICT-assisted instruction and the essential infrastructure, including basic hardware (i.e. computers) and Internet connectivity, than most Latin American countries from South and Central America. This applies both for older forms of radio-assisted instruction and new interactive forms of computer-assisted and Internet-assisted instruction.

A similar approach was taken by the author when surveying selected primary schools across Botswana. While it is important to assess institutional capacity in order to develop policy on the use of ICT in education, information on students and teachers themselves adds another important dimension. Statistics on enrolments, on teachers' training in ICT and the use of ICT use in education were also therefore presented.

# 3. Botswana Education Statistics, ICT Infrastructure and Costs

A good ICT infrastructure and affordable cost have direct positive impact on the success of ICT Literacy and the use of ICT in education. Key statistics and cost of communication will be analyzed here. Topics to be covered will include:

- Literacy and Schools Statistics
- ICT Communications infrastructure – Fiber network, fixed phone lines, mobile communication coverage.
- Fixed line Broadband
- Phone/Mobile/Land Penetration and Cost
- Telecommunication Companies key reports and indicators: BoFiNet, Mascom, Orange, BeMobile, BTC, BotsNet, BBi
- Internet access.
- Internet access in Education institutions and schools.

## 3.1 Literacy and Schools Statistics

According to Statistics Botswana Literacy Survey of 2014 the literacy rate was highest among the population aged 15 to 19 years (97.8 percent). Within this group, the male literacy rate was estimated at 97.6 percent, while the female rate was estimated at 97.9 percent. The literacy rate is generally higher for females than males up to the age of 50 years when male literacy becomes slightly higher than that of females.

Table below shows that the overall literacy rate for the population aged (10 – 70) years was estimated at 86.5 percent, which was an increase of 9.9 percent from the 2003 estimate of 76.6 percent. On the other hand, the literacy rate for the population aged (15 -65) years increased from 81.2 percent in 2003 to 88.6 percent in 2014. As has been observed in the past, the literacy rates were higher for females as compared to those of males. The study estimated the female literacy rate for the population aged (10 - 70) years at 87.3 percent compared to 85.7 percent for males. Corresponding figures for the population aged (15 - 65) were 89.6 percent for females compared to 87.5 percent for males. These figures were quoted from the Statistics Botswana Literacy Survey of 2014 report.

| YEAR | Age Groups | | | | | | | | |
|------|------------|------|-------|------|--------|-------|------|--------|-------|
|  | 10 - 70 | | | 12 - 70 | | | 15 - 65 | | |
|  | Male | Female | Total | Male | Female | Total | Male | Female | Total |
| 1981[1] | 32.0 | 36.0 | 34.0 | .. | .. | .. | .. | .. | .. |
| 1991[2] | .. | .. | .. | .. | .. | .. | 66.8 | 67.7 | 67.3 |
| 1993[3] | .. | .. | .. | .. | .. | .. | 66.9 | 70.3 | 68.9 |
| 2001[4] | 65.0 | 69.8 | 67.5 | .. | .. | .. | 69.9 | 73.6 | 71.8 |
| 2003[5] | 75.3 | 77.9 | 76.6 | 79.6 | 81.8 | 80.9 | 80.4 | 81.8 | 81.2 |
| 2010[6] | 85.1 | 86.5 | 85.3 | 87.4 | 89.2 | 88.4 | 82.3 | 83.8 | 83.2 |
| 2013[7] | 82.6 | 86.4 | 84.6 | 83.8 | 85.9 | 84.9 | 84.1 | 87.5 | 85.9 |
| 2014[8] | 85.7 | 87.3 | 86.5 | 87.3 | 88.8 | 88.1 | 87.5 | 89.6 | 88.6 |

**Figure 3.1: Literacy Rates by Year, Age, and Sex (1991-2014) – Statistics Botswana Literacy Survey of 2014.**

Following the 2011 Population Census, Statistics Botswana has produced single-age population projections to 2018. The population projections indicate that the total school-age population will increase from 680, 229 or 31.23% of the total population in 2012 to 747,159 or 33.8% in 2017 before declining to 32.99% in 2018. The increase in school-age population,

together with government plans to increase enrolment rates, increase transition rates (from current 65% to 70% (Jnr Secondary to Senior Secondary), introduce parallel pathways (30% of Jnr Secondary completers transiting to Vocational education) and increasing transition rates to tertiary level education (from 18% to 25%) all point to a need for additional resources. It will call for an increase in infrastructure, equipment and teachers/lecturers, etc.

**Table 3.1: School-Age Population Derived from Botswana CSO Single-Age Population Projections (2012-2018)**

| LEVEL OF EDUCATION | 2012 /13 Actual Enrolment | 2020 Projected Enrolment | Increase | % Increase |
|---|---|---|---|---|
| Pre-Primary | 9,995 | 55,374 | 45,379 | 454% |
| Primary | 337,206 | 378,493 | 41,287 | 12% |
| Junior Secondary | 111,305 | 138,444 | 27,139 | 24% |
| Senior   Secondary | 48,900 | 65,941 | 17,041 | 35% |
| Technical & Vocational (Secondary School Equivalent) | 5,899 | 30,434 | 24,535 | 416% |
| Tertiary (Academic & Tertiary level Tech & Vocational) | 65,702 | 100,130 | 34,428 | 52% |

**Education Statistics (2010-2012)**

These statistics on schools from primary to tertiary both public and private have been provided by the Botswana Central Statistics Organization (CSO).

| EDUCATION | 2010 | 2011 | 2012 |
|---|---|---|---|
| **Primary Schools** | | | |
| Local Government & Grant Aided | 745 | 750 | 753 |
| Private | 60 | 60 | 59 |
| **Enrolment at Primary** | | | |
| Local Government & Grant Aided schools | 310,757 | 312,580 | 316,618 |
| Private primary enrolment | 20,438 | 20,391 | 20,588 |
| Total Std 1 enrolment | 51,968 | 53,974 | 56,994 |
| Primary School teachers | 13,388 | 13,509 | 14,220 |
| Pupil: teacher ratio | 25 | 25 | 24 |
| **Secondary Schools (Junior and Senior)** | | | |
| Government aided junior secondary schools | 212 | 212 | 207 |
| Government senior secondary schools | 23 | 23 | 28 |
| Private secondary schools | 39 | 39 | 44 |
| **Enrolment at Secondary** | | | |
| Community junior and secondary schools | 119,933 | 119,933 | 120,407 |
| Senior Secondary (excluding form 6) | 51,545 | 51,545 | 51,771 |
| Total Form 1 | 40,519 | 40,519 | 41,514 |
| Total Form 5 | 27,303 | 27,303 | 25,340 |
| Secondary School teachers | 12,835 | 12,835 | 14,081 |
| **Pupil: teacher ratio at Primary:** | | | |
| Local Government Schools | 24.7 | 24.4 | 24.7 |
| Private Primary Schools | 15.8 | 15.7 | 15.4 |
| **Tertiary Institutions Enrolment** | | | |
| Teacher training Colleges | 1,595 | 1,595 | 1,595 |
| Colleges of Education | 1,185 | 1,185 | 1,185 |
| University of Botswana | 14,941 | 14,941 | 14,941 |
| | | | |
| **Literacy Rates** | **2003** | **2010** | **2013** |
| Adult Literacy rate        National | 81.2 | 83.2 | 85.9 |
| Male | 80.4 | 82.3 | 84.1 |
| Female | 81.8 | 83.8 | 87.5 |
| Note: Data for tertiary enrolment is up to 2010 | | | |

**Figure 3.2:      Education Statistics (2010-2012), CSO**

## 3.2 ICT National Network Infrastructure

Botswana is a sparsely populated landlocked country the size of France but with a population of about 2 million. This geo-demographic situation makes it economically difficult to invest in the fundamental infrastructure that reaches out to the widely spread out but small population. Despite these challenges, the government has made tremendous strides in investing in basic ICT infrastructure to enable ICT services to be accessible.

### 3.2.1 Fiber Backbone Networks - National

One of the major steps the government followed was to delink the fiber network wholesale services from the national telecommunications carrier, Botswana Telecommunication Corporations (BTC), and engaged a new independent company named Botswana Fiber Networks Ltd (BoFiNet). BoFiNet's mandate is to provide and operate a world class telecommunications backbone network infrastructure which will drive connectivity and economic growth. It is fully sponsored by Botswana Government. Today Botswana runs 1000's of km of fiber networks within Botswana and is subscribed to the two fastest undersea cable fiber networks being WACS and EASSY.
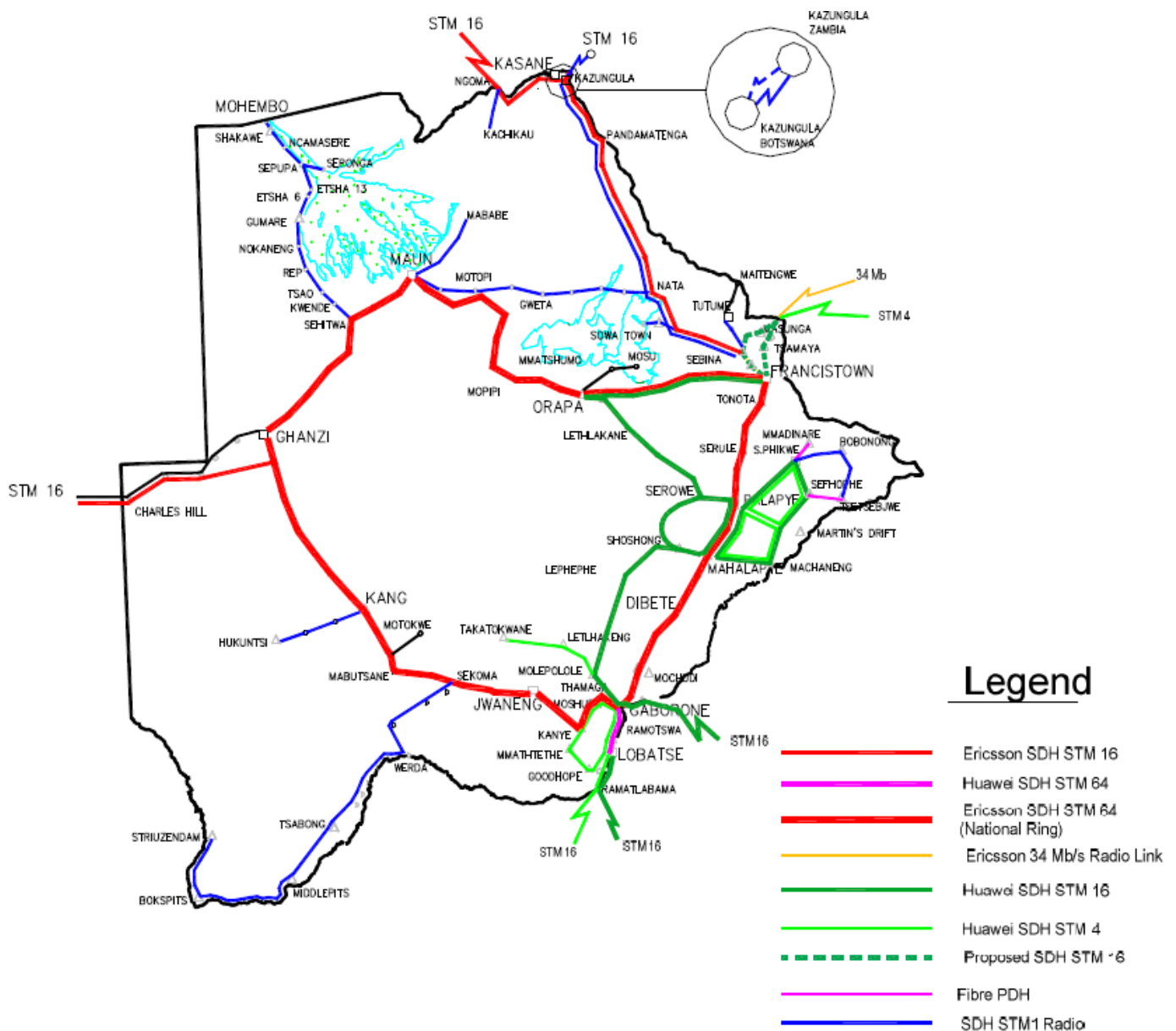


**Figure 3.2a Botswana National Transmission Network mainly on Fiber, Hipconsult**

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The figure above shows that even though the country is widely dispersed, the underlying key backbone of data communication is equally spread out. The challenge is that the fiber network runs mainly along the major highways on the western side of Botswana, which are relatively far away from remote and scattered communities and even more worrying far from schools and educational institutions. The most prohibiting factor therefore is the *last-mile* connection from these high speed fiber links to remote communities. This problem still persists on the eastern side of the country where about 80% of the country population has settled. The survey conducted for this work still indicates that schools that are few kilometers away from the fiber are still not connected to the internet.

## 3.2.2 Fiber Backbone Networks – Regional and International

The other areas where the government has made huge investment of a combined amount of about BWP 500 million is the undersea cable projects that connect the country to then world internet. The two main projects that the government invested in are the East African Submarine System (EASSy) along the eastern coast and one of the fastest fiber networks in the world, the West African Cable System (WACS).
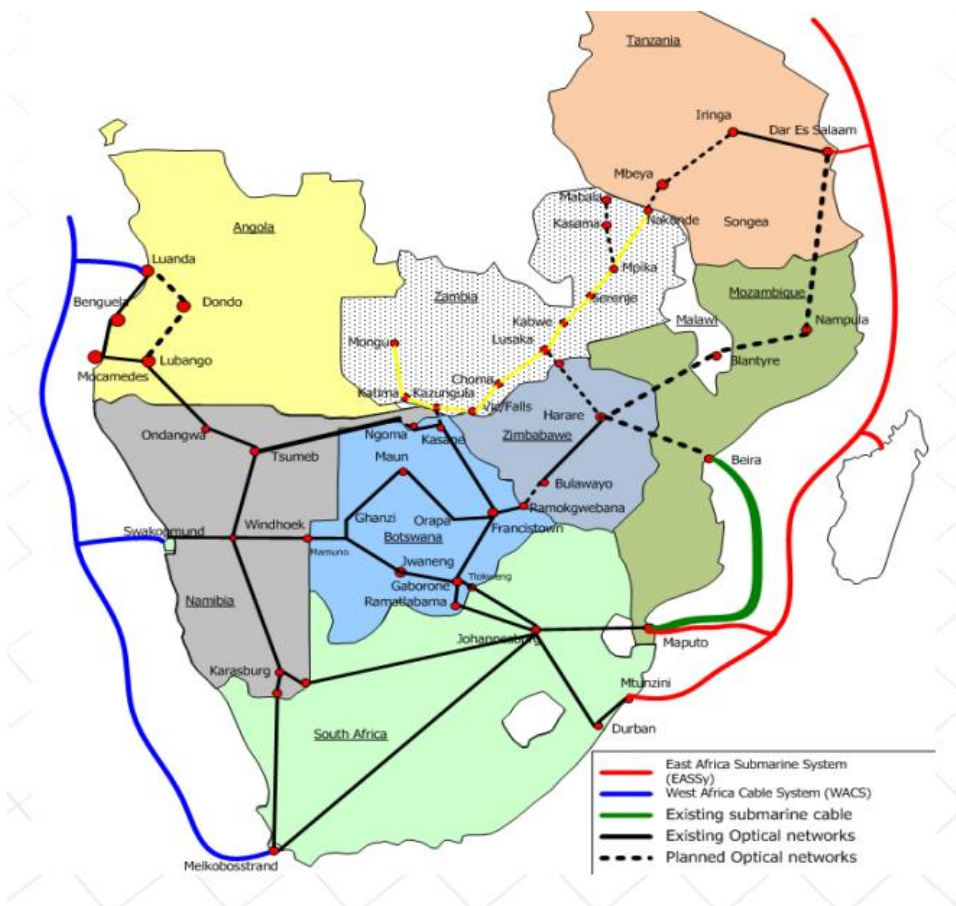


**Figure 3.2b : Botswana ICT Network Infrastructure (BOCRA National Broadband Strategy August 2013)**

## 3.2.3 Nteletsa Projects

To partly tackle accessibility of ICTs in rural areas, Botswana government initiated the Nteletsa II which is a Rural Telecommunications Development Programme aimed at providing communities with access to telecommunications services. These include voice, data and internet services. 197 villages have been identified and have been divided into four (4) areas namely; **Area 1:** 59 villages in Chobe, Ghanzi, kgalagadi and North West Districts. **Area 2:** 62 Villages in Central, Kgatleng, kweneng, Southern and Kgalagadi (South) Districts. **Area 3:** 35 Villages in Central and North West Districts. **Area 4:** 42 villages in Kgatleng and Central Districts.

## 3.3 BeMobile Cellular Coverage Map

The Government is not alone in providing infrastructure to the people of Botswana. Cellular companies also invest in wireless technologies that reach out to even remote communities afar. One of the three cellular private companies is BeMobile. BeMobile is the subsidiary arm of the major national telecommunications company, Botswana Telecommunications Corporation (BTC). The company offers both data and voice services to individual subscribers and businesses. But the company does not have any comprehensive agreement with the ministry to provide for the last-mile connection to schools despite BeMobile being a subsidiary of a company, BTC, which just recently ceased to be wholly own by the Botswana Government.
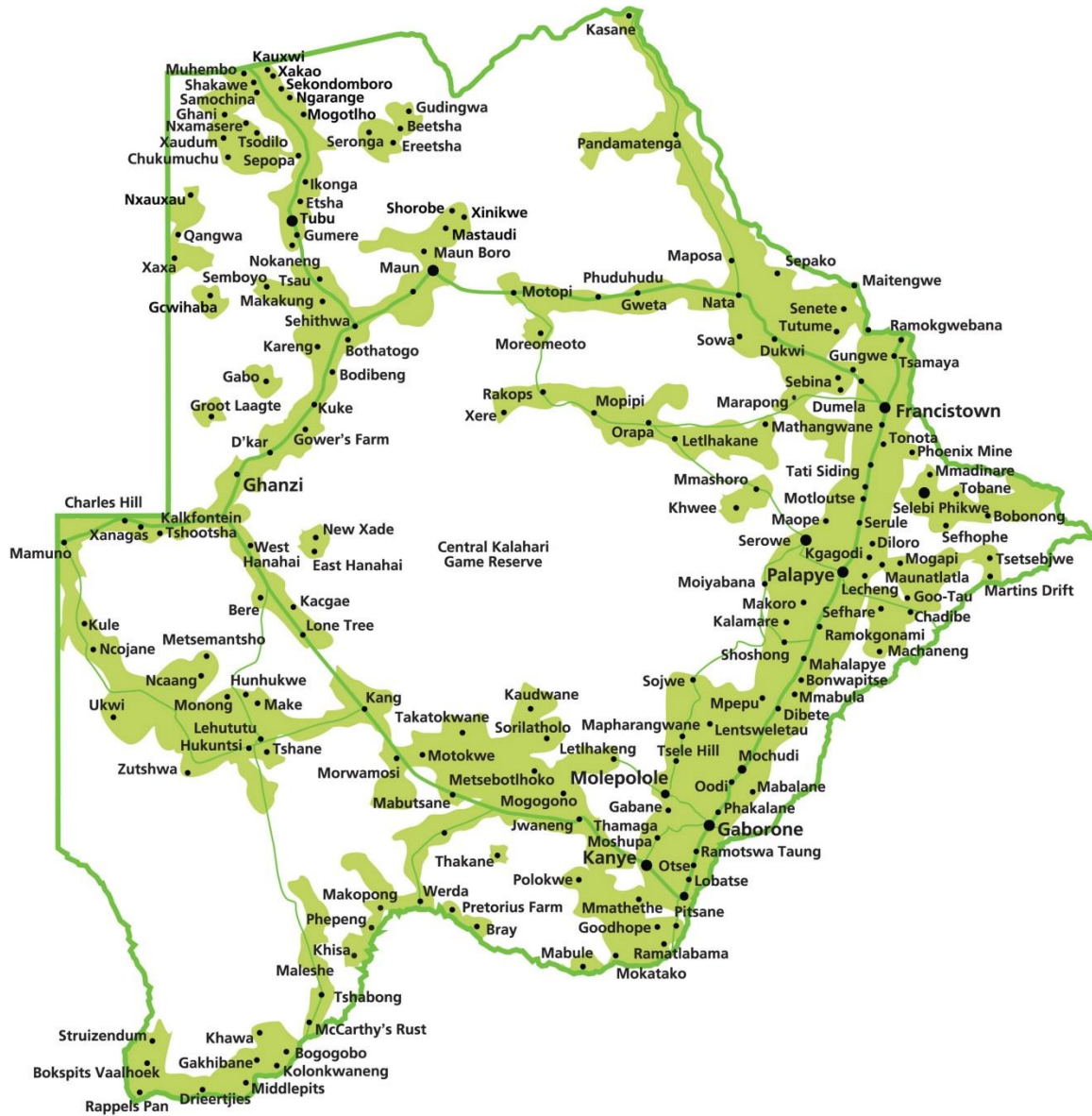


**Figure 3.3:  BeMobile Coverage Map**
(Retrieved http://www.bemobile.co.bw/nzoom/coverage.jpg Thursday, July 23, 2015)

## 3.4 Mascom Wireless Coverage Map

Mascom Wireless follows BeMobile in terms of coverage area. In 2009 Mascom entered into an agreement with the Botswana government to bring communications technology to the people through the Nteletsa II Rural Telecommunications Development Project. During the project, Mascom extended coverage to a total of 41 villages and also set up Kitsong Centers in each of the 41 villages.
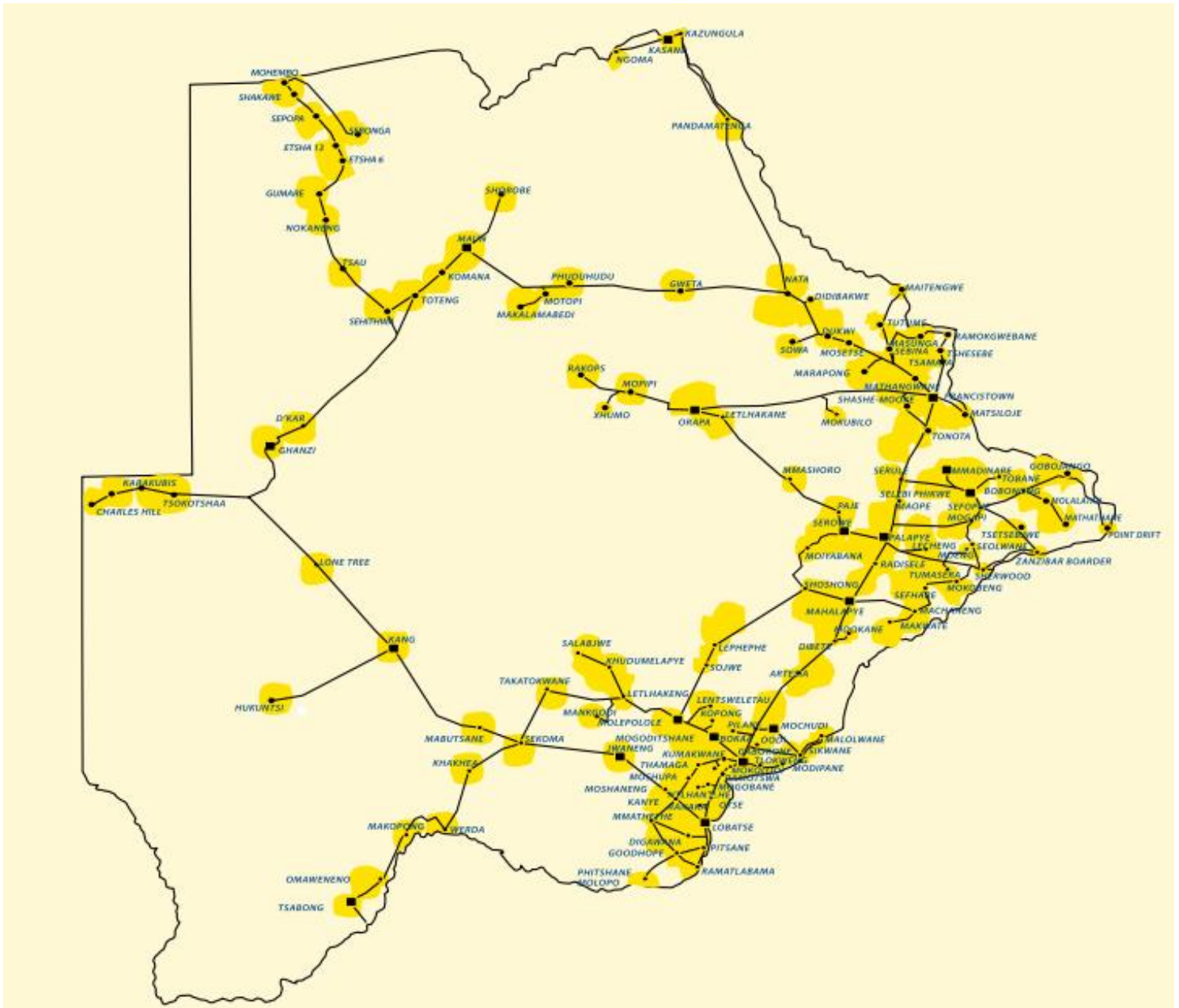


**Figure 3.4: Mascom Wireless Coverage Map – (retrieved**
http://www.mascom.bw/home/downloads/4385%20coverage%20map.pdf Thursday, July 23, 2015)

## 3.5 Orange Botswana Coverage Map

Orange is the first cellular to launch the faster wireless technology called LTE or 4G. So far 4G has been launched in some major town centers including Gaborone, Palapye, Francistown and Maun. The significance of this technology is that it can be the answer to the last-mile connectivity scourge. 4G can be the connecting technology of schools to the main fiber network which then connects the schools to the internet. Furthermore, Orange has its own share in participating in the Nteletsa II project but no specific agreement with the government to provide connectivity to schools.
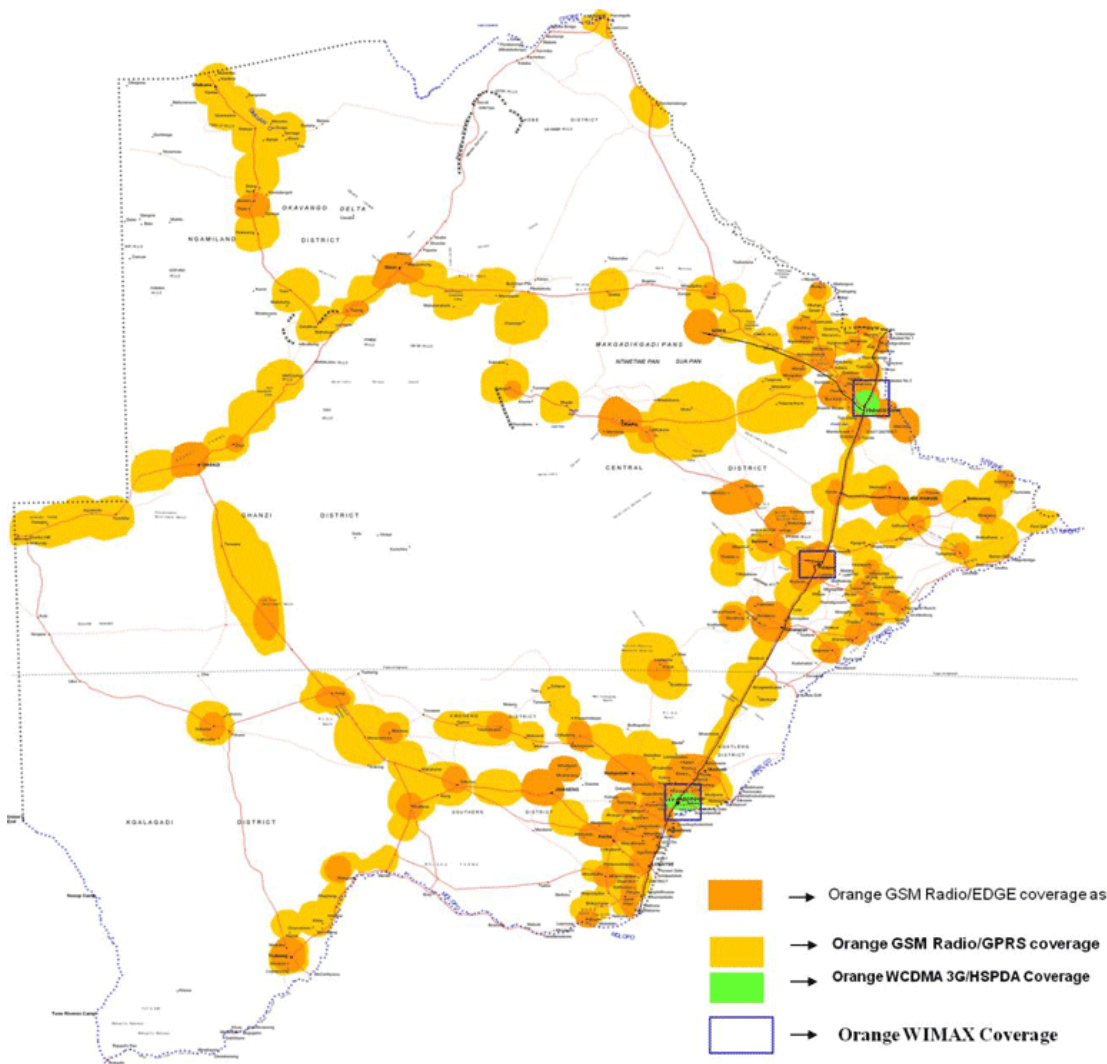


**Note**: Normal hand-held cellular phones (2-watt) will have adequate coverage* outdoors in more than 95% of the area indicated, while transportable (8-watt) cellular phones (i.e. car phones) will have coverage in at least 98% of the indicated area. Instances of coverage being lost within indicated network coverage area could occur due to natural or man-made obstructions. Conversely, coverage may also extend beyond the indicated boundaries. The information contained in this coverage map is correct at the time of going to press. It is subject to revision, where services are modified or supplemented on a customer need basis.

*Coverage denotes being able to make or receive calls and send or receive data in open terrain.

*Coverage Map correct as from 10/05/10

©Orange, 2010

**Figure 3.3 Orange Botswana Wireless Coverage Map as on 10th April 2010 (missing today's 4G coverage)**
(retrieved http://www.mascom.bw/home/downloads/4385%20coverage%20map.pdf Thursday, July 23, 2015)

## 3.6 Mobile Cellular Penetration

Botswana has seen an unprecedented growth of mobile subscriptions of more than 100% since 2009. Mobile subscriptions increased from 3,095,894 in March 2013 to 3,204,869 in March 2014. Moreover the price of mobile internet has significantly decreased for both pre-paid and post-paid mobile services. The use of smartphones has led to increased number of people with access to the internet especially among the youth. Mobile internet penetration increased from 43% in March 2013 to 49% in March 2014 as the BOCRA 2014 reports states.



Chart 3.3: Mobile-cellular subscriptions per 100 inhabitants, 2012 and 2013, Africa

Note:     Gabon mobile-cellular penetration is 215 per cent by end 2013.
Source:   ITU World Telecommunication/ICT Indicators database.
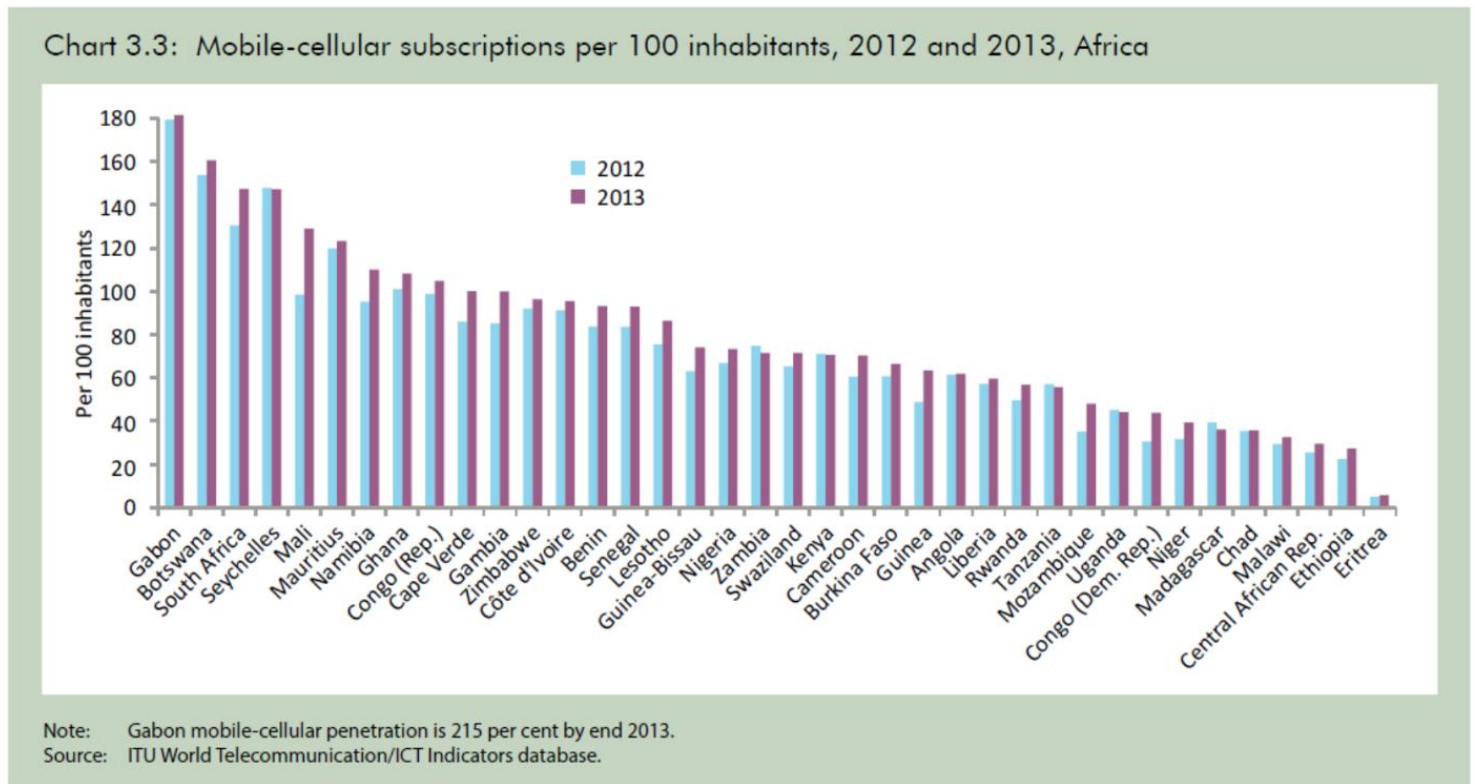
**Figure 3.6 Mobile Cellular Penetration 2013 (ITU World Telecommunication/ICT Indicators database (2013)**

## 3.7 Fixed Lines

According to Botswana Communications Regulatory Authority Annual Report of 2014, the subscriptions increased from 162,718 in March 2013 to 174,992 in March 2014, a growth rate of approximately 8% which was the same between 2012 and 2013. Over a 10 year period fixed line subscriptions increased from 136,463 recorded in March 2005 to 174,992 recorded in March 2014, a growth rate of 28%.

## 3.8 Fixed Line Broadband

The number of subscriptions to ADSL between April 2013 and March 2014 has shown a marginal increase of 3,234 subscriptions. The ADSL subscriptions increased from 16,930 in April 2013 to 20,164 in March 2014, a growth rate of 19% compared to 43% recorded in the previous period. Uptake of ADSL remains low due to low uptake of fixed telephone lines.
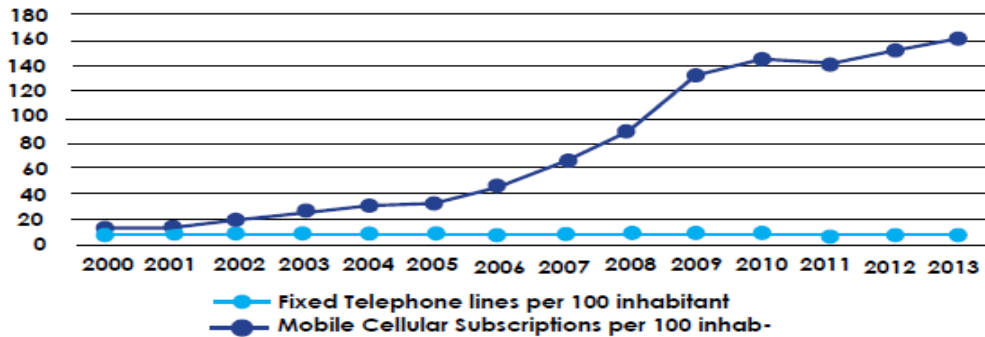
**Figure 3.1 : Fixed Telephone lines and Mobile Cellular Subscriptions per 100 inhabitants, 2000-2013 (Statistics Botswana - Information & Communication Technology (ICT) 2013 Statistics Report)**

## 3.10 Internet Access in Schools

In 2013/14, The Botswana Communications Regulatory Authority (BOCRA) started a needs assessment exercise targeting the 'unserved' and 'underserved' communities in Botswana as a way of promoting access to ICT services. The Authority has identified the education sector as one of the critical sectors requiring access to ICTs and has since undertaken a mini survey to assess the level of need. The survey revealed among others that Internet speed in schools is slow or completely non-existent; that some schools used obsolete computers; that the ratio of student to computer in schools is high, and that often computer laboratories were 'un-serviced'. BOCRA has engaged the Ministry of Education and Skills Development to support their 'schools ICT connectivity' initiative as stipulated in the National ICT Policy, 'Maitlamo' under the 'Thuto-Net' initiative.

Different media used to deliver ICT in education in schools comprise of the use of radios, televisions, telephones and computers. In 2013, of all the schools in Botswana, 60 percent of them used radios as the medium of furthering their education curriculum while 61 percent of them used televisions sets. Still in the same period 88 percent of schools had telephones. Student computer ratio in 2013 stood at 8 percent indicating that for every 100 students there were only 8 computers available for them.

|  | Proportion | Percentage |
|---|---|---|
| Schools with radios | 0.6 | 60 |
| Schools with TV | 0.61 | 61 |
| Schools with telephone | 0.88 | 88 |
| Students computer ratio | 0.08 | 8 |
| Schools using narrow band internet | 0.24 | 24 |
| Schools using fixed broad band internet below 256kbits/s | 0.04 | 4 |
| School using mobile broad band internet | 0 | 0 |
| Students with access to the internet at school | 0.47 | 47 |
| ICT qualified teachers in primary and secondary school | 0.05 | 5 |
| Schools with electricity | 0.89 | 89 |

Source: Ministry of Education

**Figure 3.10: ICT In education Services across Schools, 2013 (Statistics Botswana - Information & Communication Technology (ICT) 2013 Statistics Report**

## 3.11 Internet Prices

In line with its mandate of ensuring affordability of communications services, BOCRA continued to engage the four major public operators, being, Botswana Fibre Networks (BoFiNet), Botswana Telecommunications Corporation Limited (BTCL), Mascom Wireless Botswana and Orange Botswana to facilitate the reduction of tariffs on telecommunication and Internet services at both wholesale and retail levels to reflect the underlying cost of providing the services. To this end, this section details tariffs reductions that BOCRA approved recently.

### ADSL PRICES (2011-2014)

*RETAIL ADSL PRICES BTCL (BWP)*

| Speed (kbps) | 2011 | 2012 | 2013 | 2014 |
|---|---|---|---|---|
| Bronze – up to 512 | 606.93 | 562.13 | 547.23 | 372.59 |
| Silver – up to 1024 | 746.42 | 690.98 | 671.78 | 489.19 |
| Gold – up to 2048 | 939.13 | 844.10 | 843.93 | 624.19 |
| Platinum – up to 4096 | n/a | n/a | 943.00 | 943.00 |

*2014 Orange Internet Prices (All my Internet Package)*

| Duration | Bundle Capacity | Bundle Price | In Bundle Rate/MB |
|---|---|---|---|
| 1 day | 150 MB | P20.00 | P0.13 |
| 1 week | 400 MB | P79.00 | P0.20 |
| 1 month | 800 MB | P149.00 | P0.19 |

*2014 BTCL Mobile Internet*

| Package | Bundle Price | In-bundle Rate/MB | |
|---|---|---|---|
| 14MB | P10.00 | P0.71 | |
| 30MB | P20.00 | P0.67 | |
| 75MB | P50.00 | P0.67 | |
| 160MB | P100.00 | P0.63 | |
| 350MB | P250.00 | P0.71 | |

*2014 Mascom Mobile Internet*

| Duration | Package | Bundle Price | In-bundle Rate/MB |
|---|---|---|---|
| 14 days | 14MB | P9.50 | P0.68 |
| 14 days | 30MB | P19.50 | P0.65 |
| 30 days | 70MB | P45.00 | P0.64 |
| 30 days | 130MB | P80.00 | P0.62 |
| 90 days | 250MB | P150.00 | P0.60 |
| 90 days | 500MB | P300.00 | P0.60 |
| 90 days | 1200MB | P600.00 | P0.60 |

## 3.12 Radio Coverage

The technologies that enhance students learning are not exclusively ICTs. The traditional one way radio communication is still, and should be, practiced today by the government radio stations.  Government radio stations are Radio Botswana one and two. (RB1 and RB 2) while the privately owned radio stations are Gabz FM, Yarona FM and Duma FM.
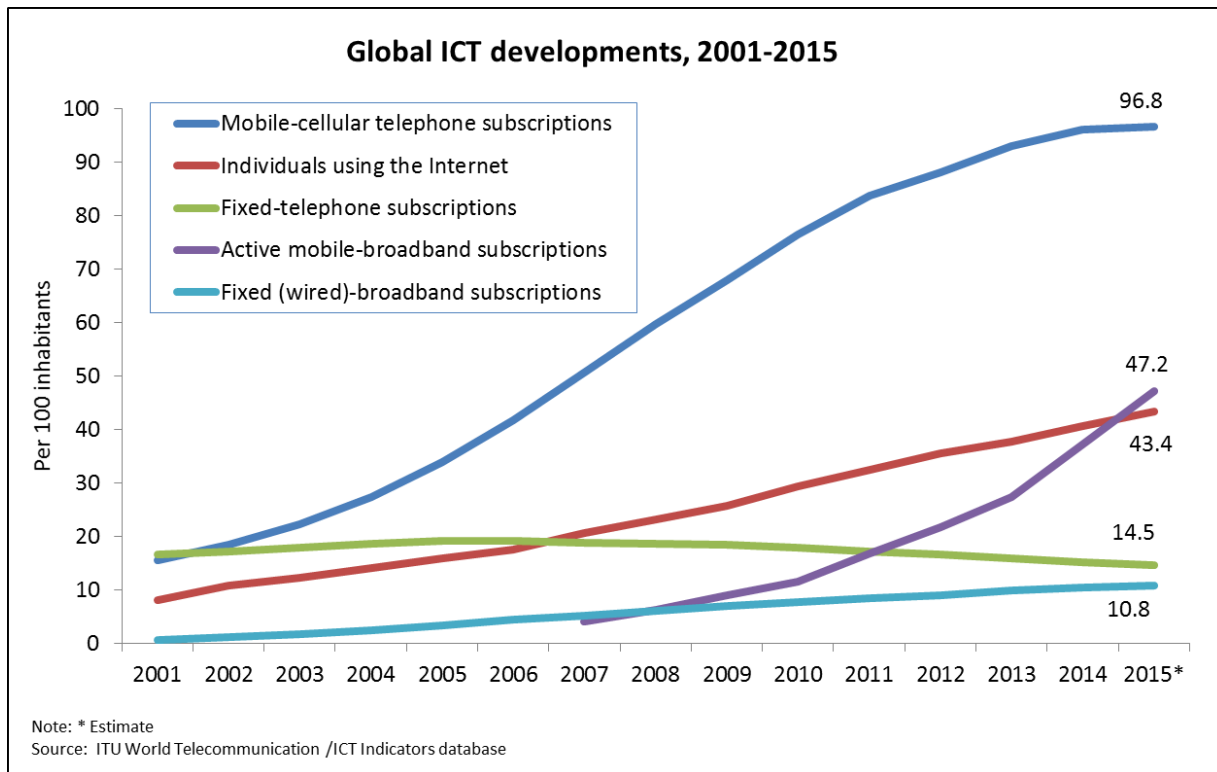
## 3.13 Summary of the World ICT Developments



**Figure 3.13 Global ICT developments, 2001-2015**

# 4. Desk Top Survey – Reports and Policy Documents

As earlier mentioned, the main objectives of this report focus on Botswana Effective Practices on the use of ICTs in education which are:

- Revise, and make reference to, the UNESCO's commitment to ICTs in Education
- Identify current Botswana ICTs in education environment and practices
- Review the current country Education Policies and Literature that focus on ICT Literacy and ICT in Education.
- Identify Botswana practices of ICT in Education
- Compare the Botswana practices on the use of ICT in Education with global practices
- Summarize the study findings
- Highlight gaps, strength and opportunities of Botswana ICT Literacy
- Make recommendations in line with the UNESCO Post-2015 Education agenda and Country's long term objectives of Education.

**UNESCO -** Expanding innovative learning opportunities, particularly through Information and Communication Technologies (ICTs) in education

UNESCO is convinced that technology-based solutions, if driven by pedagogy, can represent a major contribution to increasing access to and the quality of education and learning; to reducing inequalities in education (particularly with regard to disadvantaged groups); and to promoting the creation, sharing and adaptation of high-quality educational resources. UNESCO is in a leading position and committed to promoting the adoption of technology-based solutions to expanding access to education and facilitating knowledge dissemination, more effective learning and the development of more efficient education services. It will support the development of new approaches to teaching and learning and the capacity of teachers to integrate this in their work. Through its work on technology in education, UNESCO will place major emphasis on the empowerment of women and young girls including through mobile learning. UNESCO will support multi-stakeholder partnerships in ICTs in education, particularly with IT industries. In order to support Member States in harnessing the opportunities offered by technologies in education, UNESCO, including the UNESCO Institute for Information Technologies in Education (IITE), will articulate its actions around four key areas, namely:

(a) *Policy dialogue and capacity development: Through policy dialogue and capacity development, UNESCO will support Member States in the design and analysis of comprehensive technology policies for the reform of their education systems. It will facilitate benchmarking and peer learning among Member States, and contribute to the definition of an international set of policy indicators and corresponding data collection*.

(b) *Teacher standards and professional development in ICTs: Teachers' skills and ability to take full advantage of the Internet as an educational resource and as a means of sharing educational content remain key challenges. To address them, UNESCO shall provide assistance to Member States willing to develop policies to train and support teachers for the effective use of technology. In partnership with key stakeholders including those in the information technology industries, UNESCO shall continue the development and update of the ICT Competency Framework for Teachers (ICT-CFT) aimed at assisting educational planners and teacher training course developers to prepare teachers for making effective use of technology solutions*.

(c) *Mobile learning: Mobile technologies offer a window of opportunity in education, in particular in developing countries, because they make use of existing devices and networks. UNESCO, in cooperation with key stakeholders in this area, shall continue to facilitate the realization of the potential of mobile learning by investigating current practices, promoting innovations in areas such as literacy – particularly for women and girls – teacher development and school management, and by reporting on policy developments*.

(d) *Open Educational Resources (OER):* UNESCO is one of the leading agencies in supporting the OER movement and the Paris OER Declaration (2012) already provides a set of principles and guidelines for the development and use of OERs in education. UNESCO will enhance its advocacy efforts; document and disseminate what works both in terms of policy and institutional practice; and facilitate international cooperation in this area. At their request, UNESCO will work with Member States to develop supportive policy environments for OER.

**Identification of Existing Relevant Botswana Departments and Reports:**

This study identified existing documents and government departments that are relevant to ICT in Education. This will include, but not limited to relevant reference to reports and formal documents of the following:

- Ministry of Education and Skills Development (MoESD)
- Ministry of Infrastructure, Science and Technology (MIST)
- Ministry of Finance and Development Planning (MFDP)-**National Development Plans**
- Botswana Department of Statistics Office
- Department of Non-Formal Education
- UNESCO
- Botswana Communications Regulatory Authority (BOCRA)
- Education regulatory bodies including: Botswana Qualifications Authority (BQA), Tertiary Education Council (TEC), Botswana Examination Counsel (BEC), Botswana Human Resource Development Council (HRDC).
- Institutions including: University of Botswana, Botho University , Limkokwing University, BOCODOL, BCA, Teacher Colleges, Vocation Training Colleges, Thuto-Net
- Policies including: ICT Policies, ICT in Schools Programme (RNPE) , Microsoft Botswana Schools Partnership, Botswana vision 2016, Early Childhood Programme, and Non-Formal Education

## 4.1 Botswana Government Departments and Ministries

**Ministry of Education and Skills Development (MoESD)**

The MoESD is the largest ministry by far among other Botswana government ministries. Its mission is to provide efficient, quality and relevant education and training that is accessible to all. It has consistently received the largest share of the annual budget of P11 billion (USD1.1 billion) for the financial year 2015/2016. The mandate of the MoESD is to drive the national education agenda from pre-school up to post postgraduate level. The mandate includes financially supporting both the national educational facilities and the training of skilled manpower to man these institutions. Unlike in some other countries this ministry in Botswana is not split into Primary, Secondary, and Tertiary ministries. Instead all education level administration are grouped under one ministry.

**The National Policy on Vocational Education and Training (NPVET) in 1997.**

The NPVET was developed under the supervision of both the Ministry of Education and Skills Development (MoE&SD) and the Ministry of Labour and Home Affairs (MLHA), with the objective to place vocational education and training at the same level as academic education and to "integrate the different types of vocational education and training into one comprehensive system" (Republic of Botswana, 1997).

In order to meet the recommendations of the NPVET, the Government enacted both The Vocational Training Act (2000), which led to the establishment of the Botswana Training Authority (BOTA), and The Tertiary Education Act, which steered the formation of the Tertiary Education Council (TEC).

Equally important is the ministry's role in drawing out subject specific pedagogical policies and syllabus. The syllabus is very prescriptive to specific topics to cover daily basis and particular exercises to do.

Other crucial ministries and departments that are a key stakeholders in the ICTs in Education are:

- Ministry of Infrastructure, Science and Technology (MIST)
- Ministry of Finance and Development Planning (MFDP)-National Development Plans
- Botswana Department of Statistics Office
- Department of Non-Formal Education
- UNESCO National Commission, Gaborone, Botswana
- Botswana Communications Regulatory Authority (BOCRA)

## 4.2 Education related Policies and Initiatives

### 4.2.1 ICT Policies

The Government of Botswana has a national ICT policy, called *Maitlamo* which provides a roadmap to drive social, economic, cultural, and political transformation through the effective use of ICTs. *Maitlamo* aims to provide a communications network that meets high international standards and ensures the country has the skills to be an ICT leader. The policy's key goals are for Botswana to become a sub-Saharan ICT hub, to create an enabling environment for the growth of an ICT industry in the country, and to provide universal service and access to information and communication facilities in the country.

Effort to introduce ICTs into the education sector by the MoESD is through the implementation of the Thuto-net component as part of the national Maitlamo Policy on ICT. However, although there are many initiatives in Botswana dealing with ICT in education, efforts have largely been geared towards the deployment of ICTs to institutions via the provision of computers. Access ratio in both primary and secondary schools however is still below the standards and numbers demanded the concerns are serious for the lower levels of education. For example in some primary schools surveyed for this report, there are hundreds of pupils in primary schools who share two, three, or four computers that are available and functioning in the whole school.

The global trend is countries that do well economically tend to introduce ICT Literacy as early as kindergarten level. There is no ICT Literacy – or computers - in the vast majority of primary schools in Botswana and only limited numbers of computers at the junior and secondary levels. And for junior secondary schools the Computer Awareness course is not even compulsory and there is no examination written on it.

### 4.2.2 Education and Training Sector Strategic Plan (ETSSP)

**The ETSSP** is a five year medium term strategy 2015 to 2020 designed to comprehensively and fundamentally transform education from pre-primary to tertiary level. It is in line with the national education priorities that influenced the framing of the African regional education priorities. These latter priorities were articulated at the recent World Education Forum in Incheon South Korea. Following this Conference, the Global Education Agenda, which will take everything into account, will be released before the end of the year 2015.  One of the critical Sector Strategic priorities is *Utilization and Integration of ICT in the Education system*. This priority is central to the main objectives of this desktop study. The policy clearly stipulates that to improve quality and relevance of education there must be adequate learning materials in the classroom; using information and communication technology (ICT) with blended learning approaches to improve learning and meet the need for skills development and targeting disadvantaged and marginalized groups so that they can fully take part in education.

To improve the learning outcome, the ETSSP plans to initiate activities that will work towards supporting teaching practices in the classroom. This will mean improving professionalism, teaching skills, subject content knowledge and ICT skills of teacher through life-long learning opportunities. A priority will be on improving attendance and accountability for appropriate use of time in school by teachers and other officials at school and district level, particularly in classrooms.

For the utilization and Integration of ICT and e-Education the Botswana government is committed to the implementation of the National ICT Policy that will position Botswana for sustained growth in the digital age by serving as a key catalyst in achieving social, economic, political and cultural transformation within the country. Greater access, utilization and integration of ICT as a means to improve teaching and learning and also a tool to improve education management is a key strategy linked to improving learning outcomes. Introducing ICT into the early years of schooling is imperative if the country is to meet the NDP goals. The MoESD is working through the Thuto-Net initiative to support education and ICT through networking and e-learning platforms.

### 4.2.3 ICT in Education - Thuto-Net

The Ministry of Transport and Communications in partnership with the Ministry of Education and Skills Development is at a stage of separating the schools connectivity infrastructure from the Government Data Network. To successfully implement the Thuto-Net programme, an efficient infrastructure connecting all schools and learning centers must be accessible, affordable, fast and offering reliable network services. "*The School Connectivity Initiative will connect about 100 primary schools (out of 753 schools), 208 junior schools, 35 senior schools, 13 colleges and 40 Brigades*" to quote the report.

The Government of Botswana is committed to developing a National Information and Communications Technology (ICT) Policy that builds upon recent government ICT initiatives. There are efforts to introduce ICTs into the sector by the MoESD through the implementation of the Thuto-net component as part of the national Maitlamo Policy on ICT. But the little that has been done focused on simply providing schools with a limited number of computers without a clear implementation strategy for their use in education. This lack of strategy on ICT in education was confirmed by the survey carried out for this report on primary and secondary schools.

However, it is recognized that in the absence of a national policy and sector wide coordination, such initiatives will be faced with challenges. Therefore the emergence of the Education and Training Sector Strategic Plan (ETSSP) for 2015-2020 provides the opportunity to provide a clear purpose and rationale for how the Thuto-net component of the national policy will be effectively integrated into the sector, including identifying opportunities, issues, challenges and strategies that will be employed. The aim will be to manage the integration of ICT across all the sub-sectors in a strategic and coordinated way.

"*It is acknowledged that for Botswana to make any appreciable progress in its socio-economic development efforts, substantial resources will need to be directed at improving educational delivery. In this regard, the Government of Botswana is committed to developing a National policy. The key role that Information and Communication Technologies (ICTs) can play in widening ease and opportunity of access to education to a wider section of the population and literacy education is recognized. ICT will support key priority areas within NDP10 for improved educational delivery and training and improve quality learning through the integration of ICT to improve learner achievement at all levels. The need is for a coordinated, focused and properly managed approach to the adoption and utilization of ICTs in education. Such an approach is contained in the Thuto-net component that seeks to improve the accessibility and delivery of quality education and better maximize the impact of ICTs in education. The programme emphasizes the integration of learning, teaching, capacity building, research and administrative practices with information and communication technologies (ICT) that will support the implementation and achievement of the national goals.*" Thuto-Net.

The Thuto-Net is an expansive project that incorporates the Schools Connectivity Initiative, to link all secondary schools to the internet. At present 104 secondary schools, out of a total of 235, throughout the country have internet access and the programme is rolling out to other secondary schools. All secondary schools in Botswana have computer laboratories with about 15-20 computers. This initiative is aimed at reducing literacy gaps between students in urban schools and rural schools. To fast track the program, the department responsible for laying out the infrastructure is working together with the Department of Education to train teachers on using ICT as a classroom tool.

## 4.2.4 ICT in Schools Programme

Over the past decade, Botswana has made considerable efforts to review its socio economic development efforts and re-align its planning efforts accordingly. The Education System was reviewed in 1993 and a responsive policy (The RNPE) subsequently published in 1994. The goals of this education policy are to prepare Batswana for the transition from a traditional agro-based economy to the industrial economy. It further addresses issues of access, equity, and the improvement of the quality of education. Education For All (EFA): The Dakar Framework for Action - National Action Plan for Botswana (EFA-NAP) was developed within the context of the existing Revised National Policy on Education (RNPE) Government Paper No. 2 that was approved by Parliament in 1994. Another major policy document that has contributed to the EFA-NAP is the Botswana Vision 2016 which was formulated in 1996 to guide the country's strategic planning and policy development. The Vision envisages that all Batswana nationals will embrace and actively participate in the process of transformation across a broad spectrum of the social, economic, entrepreneurial, political, spiritual and cultural lives of Botswana.

## 4.2.1 ETSSP and Thuto-Net Plan of Action

Towards this end ETSSP will support the implementation of the Thuto-net component of the national Maitlamo policy and include:

- Providing schools with high speed internet access (≥128kbs);
- Increasing computer to student ratio in schools;
- Designing and implementing an ICT content and curriculum development programme for primary, secondary, vocation and tertiary schools;
- Design and implement a professional development programmes to increase ICT capacity building for teachers;
- Utilising e-Learning to advance the use of communication technologies to design, deliver and extend learning;
- Developing adult ICT skills programmes for non-formal learners;
- Design and implement ICT initiatives - blended learning and e-books
- Implement a strong ICT proficiency measurement and skills monitoring programme
- Support the promotion and awareness of ICT within the communities
- Support e-Education Research & Development;
- Securing funding to sustain ICT in education.
- Developing ICT workforce skills in collaboration with industry needs;

## 4.2.5 Key Programmes

- **ICT 1**   Provide schools with high speed internet access (≥128kbps)
- **ICT 2**   Integrated e-Learning curriculum across all levels
- **ICT 3**   Integration of ICT in teaching and learning across all levels
- **ICT 4**   Capacity Development for the Implementation of Thuto-Net
- **ICT 5**   E- Content for Primary, Secondary, Vocational, Tertiary levels and Open and Distance Learning (ODL) programmes
- **ICT 6**   Utilizing e-Learning to advance the use of communication technologies
- **ICT 7**   Supporting Education research and development

## 4.2.6 Botswana vision 2016

Vision 2016 is a national manifesto of the Botswana government that articulates the long-term economic goals for the country including strategies to address them. ICT is a key component of the first goal, which is to be an educated and informed nation. The long-term vision is that Botswana will enter the information age on an equal footing with other nations. The country will seek and acquire the best available information technology and become a regional leader in the

production and dissemination of information. ICT is also a major focus of the country's economic agenda, the National Development Plan 9 (NDP9), and significant investment has recently been made in upgrading Botswana's communications networks to facilitate new technologies. In 2002 Botswana established a government ministry dedicated to ICT, the Ministry of Communications, Science and Technology.

### 4.2.7 National E-Government Strategy

The Botswana e-Government Strategy, code named 1Gov, outlines the processes for the modernization of Government, the enhancement of transparency, accountability and good governance; making the Government more result-oriented, efficient and customer centric. E-Government is therefore going to bring huge benefits to the society. To derive the benefits articulated in this strategy, a secure ICT infrastructure; enabling laws; an ICT-literate population; and a participative public are required. Information and Education campaign also needs to take place within government itself, and the public at large, to sell and demonstrate the full advantages and benefits of the transitioning to e-government.

### 4.2.8 Early Childhood Programme

Early childhood care and development (ECCD) still remains the part of Botswana's education system that has the lowest participation rates. This is partly due to the fact that education policy has not singled out this level for rapid expansion in the way that was done with the primary level about 30 years ago, and the secondary level in the past decade. By and large, NGOs and the private sectors run the ECCD sector. However, the current education policy, the RNPE, has charged government with the responsibility of developing mechanisms for the co-ordination of this sector.

### 4.2.9 Non-Formal Basic Education (NFBE)

Commitment of Government in providing adult literacy education is through the Botswana National Literacy Programme. It primarily provides literacy. Established in 1980, the major objective of the national literacy program was to enable 250,000 illiterate men, women and youth to become literate in Setswana and numerate over six years from 1980-85.

### 4.2.10 Technical and vocational education and training (TVET)

UNESCO Recommended comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life.

## 4.3 Education regulatory bodies including:

**Botswana Qualifications Authority (BQA)**

Botswana Qualifications Authority (BQA) was established through the enactment of the Botswana Qualifications Authority Act No 24 of 2013 .The BQA commenced operations on the 8th November 2013 following an Order issued by the Minister of Education and Skills Development to effect the  Act. The coming into effect of the BQA Act means that the Botswana Training Authority (BOTA) has been effective 8th November 2013, continued under the new name of the Botswana Qualifications Authority (BQA).  The BQA Objectives are:

- To provide for and maintain the National Credit and Qualifications Framework (NCQF).
- To coordinate the education, training and skills development quality assurance system**.**

**Botswana Examination Counsel (BEC)**

BEC is mandated under section 5 of the Botswana Examinations Council Act (Act No. 11 of 2002) to conduct school examinations and any other examinations for the Ministry of Education and Skills Development and issue certificates in

respect of the examinations. BEC's key business activities include examinations and assessment policy and programme development, the conduct and regulation of national school examination programmes and the award of certificates for programmes in the general education subsector.

**Botswana Human Resource Development Council (HRDC)**

The objectives of the Council shall be to;

- Provide for policy advice on all matters of National Human Resource Development;
- Co-ordinate and promote the implementation of the National Human Resource Development Strategy;
- Prepare the National Human Resource Development Plan; and
- Plan and advise on Tertiary Education Financing and work-place learning;

## 4.4 Higher Education Institutions

The Botswana Tertiary Education Policy moto is "Towards a Knowledge Society" and it is meant to provide guidance as to the future direction of tertiary education for the next two decades. To ensure that by 2026 more Botswana aged 18-24 years have access to a quality tertiary education that is responsive to every element of their personal well-being, social progress and economic development and which advances to the fullest extent possible their potentials for learning and their individual capacities in a manner that will further their aspirations and contribute to the development of a globally connected and prosperous nation.

Botswana has several government and private training institutions that produce IT graduates with certificates, diploma and degree qualifications. Notable among these institutions are: University of Botswana, Botswana Institute of Administration and Commerce (BIAC), Botswana Accountancy College, Limkokwing University of Technology, NIIT, Baisago University, and IBM University.

Besides, Botswana's research and development infrastructure includes several government-funded institutes that undertake research and development work to meet the specific needs of Botswana. These include The Botswana Institute for Technology Research and Innovation (BITRI), the National Food Technology Research Centre (NFTRC), the Department of Agricultural Research (DAR), Botswana Institute for Development Policy Analysis (BIDPA) as well as other government research departments. Veld Products Research and Development and Thusano Lefatsheng are non-governmental research organizations that undertake research in non-timber forest products and medicinal plants respectively.

Further, the following are some of the tertiary education institutions:

- University of Botswana
- Botho University
- Limkokwing University
- BOCODOL
- BCA (Now Botswana University of Agriculture)
- Botswana International University of Science & Technology
- Teacher Colleges

## 4.5 Review of the Reports

Having identified relevant reports above, they will be reviewed with particular relevance to the study. The following points will be recorded:

- Summary of key findings
- Summary of relevant statistics and landscape of ICT infrastructure and penetration
- Identification of Non-Formal education practices in the use of ICTs in Education
- Summary of ICT Literacy in Early Childhood, Primary, Secondary, Colleges, and Tertiary Education with particular attention to practices and syllabus of ICT Literacy and ICT in Education
- Identification of stakeholders and NGO in support of ICT Literacy
- Limitation highlighted by relevance of the reports
- Summary and analysis of impact of the reports in ICTs in Education (covered on the point above, gaps)
- Graduate and undergraduate research reports

# 5. Desk Top Survey – ICT in Education

The study compiled a documentation on good practices and cite lessons learned in the use if ICTs in education at different levels from early childhood, primary, secondary, higher education, inclusion, and adult literacy) and cover both formal and non-formal education.  ICT in Education is discussed for the following:

1. Non-Formal and Adult Education (age 21 and older)
2. Education to People with Disabilities?
3. Pre-Schools (age 0-5)
4. Primary Schools (age 6-13)
5. Secondary Schools (age 14-16)
6. Secondary Schools (age 17-18)
7. Tertiary Colleges and Universities (age 18 and older)

## 5.1 Non-Formal and Adult Education (age 21 and older)

In this section non-formal education in the use of ICTs in in education is reviewed.

One of the success stories in the use of ICTs in Education and education access is of Non-Formal Education sector driven by Botswana College of Distance and Open Learning (BOCODOL). In 1998 the Department of Non-Formal Education fully expanded and transformed the Distance Education Programme and established BOCODOL and by its nature dictated the use of ICTs as an enabler in widening outreach to non-formal education students scattered across the country. Inclusive Education policy (2012)

Thuto-Net is further reviewed here.

The out of school sector has four main sub-sectors being:
- Adult basic education
- Continuing education
- Education for out of school youth and adults
- Extension education

The officially recognized sectors are:
- The Department of Non-formal Education (DNFE in the MoE)
- The Botswana College of Distance and Open Learning (BOCODOL)
- Private schools, private vocational centres and study groups

## 5.2 Education to People with Disabilities?

Though limited it is important to review the use of ICTs in education for the disabled especially by tertiary institutions that have more established policies and practices on the education for the disabled. For further reference refer to Botswana Inclusive Education policy (2012)

## 5.3 Pre-Schools (age 0-5)

ICT use is of vital significant in preschool educational process. It can become one valuable tool for teaching and learning when properly used by teachers (Lovari & Charalambous, 2006). However the Botswana Government Early Childhood Programme and Private Schools practices on ICT in education for 0-5 year old pupils are almost non-existent.

The Ministry of Education is mandated with the management of pre-primary education while the Ministry of Local

Government is responsible for Day Care schools. Access to early childhood education remains limited to about 7% of the population aged 3-6 years as pre-primary education is costly and the charges and the tuition fees are not standardized. Only children with parents who can afford the high costs access such schools. Consequently, the facilities have remained concentrated in urban areas largely as a preserve of the rich and middleclass population inevitably isolating the poor in the rural areas(Botswana Education for All (EFA) – National Action Plan, Ministry of Education Skills Development, (2002)).

## 5.4 Primary Schools (age 6-13)

There is a new study conducted by Aesaert **et al (**2015) that presents a multilayered model that can be used to guide future studies that tries to explain why some primary-school pupils are more effective in acquiring ICT competences than others. Factors are situated on the pupil, classroom and school level. Second, this study provides future research with a range of reliable measurement instruments to identify factors related to primary school pupils' ICT competences. These factors were drawn from the developed multilayered model. A survey was conducted in a large sample of primary school pupils (n = 2413), their parents (n = 2267) and their teachers (n = 134). The results of the replication exploratory and confirmatory factor analyses indicate a good factorial validity and reliability of the developed scales. This led to the production of the EDC Model below
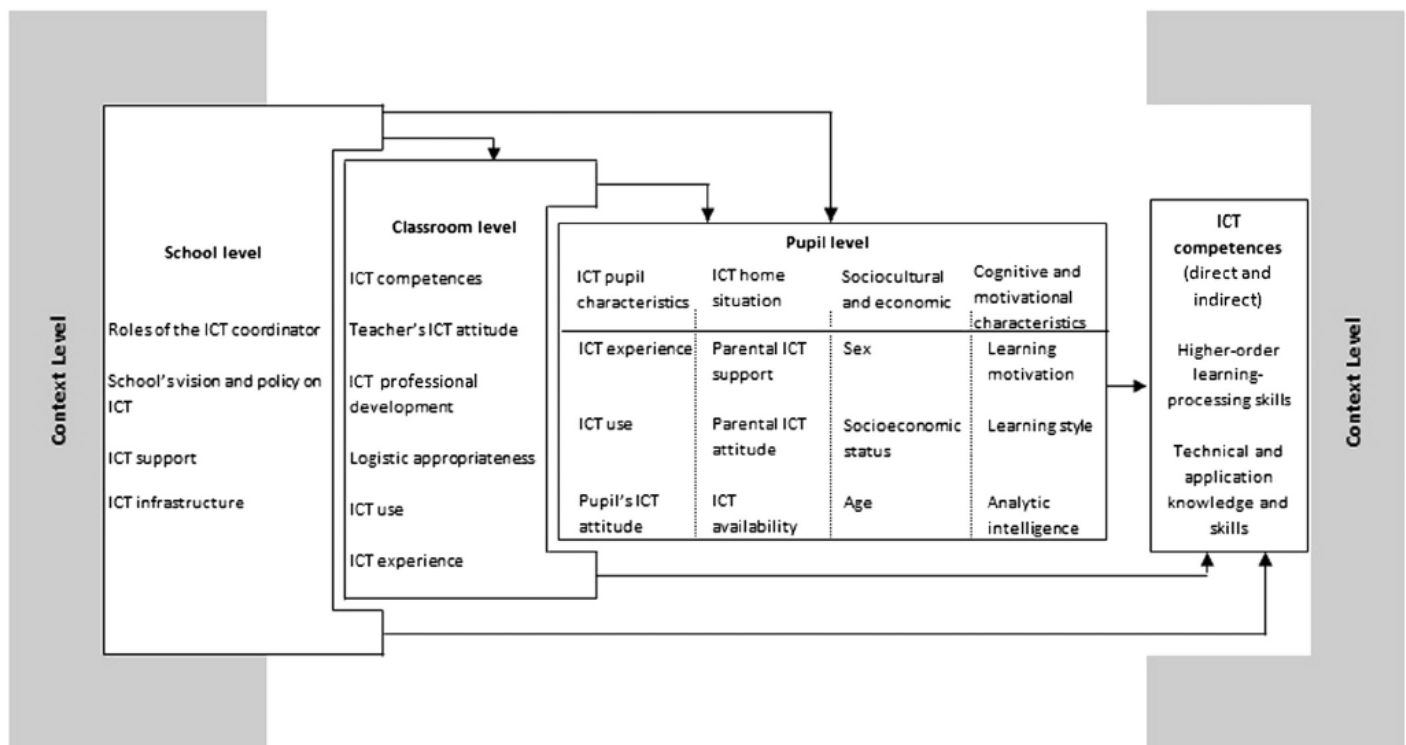


**Figure 5.4: The extensive digital competence (EDC) model.**

**Primary School Curriculum**

The primary school curriculum comprises mainly six learning areas of English, Setswana, Mathematics, Environmental Science, Cultural Studies, and Creative and Performing Arts. Setswana and English are used as medium of instruction. A variety of pedagogic approaches are used in teaching in the primary school sector. One of the most popular approaches is the Breakthrough programme used in the teaching of languages. The Ministry of Education is in favour of the child centred methods of teaching (RNPE, 1994).

To support that, the UNESCO Institute for Information Technologies in Education (IITE) focuses on guidelines on making the best use of the educational potential of ICT by facilitating a corresponding policy dialogue and promoting capacity development through international networking and collaboration. In its activities, IITE initiated various studies about possible and actual roles of ICT at school. In 2010 IITE conducted an analytical survey about the integration of ICT into early childhood formal education. Its findings have been well accepted by practitioners and policy-makers. When we consider the potential of new technologies to support the development, learning and play of pre-primary children with such achievements as reported in the study, it becomes natural and necessary to explore similar phenomena in the successive level of formal schooling – in primary education.

But looking at the sampled Primary Schools by the author under section 6.1. ICT in Primary Schools, the table and results indicate worrying trends in terms of primary schools readiness to make ICT accessible to primary school pupils, let alone to infuse ICT into other subjects' pedagogical activities and their delivery.

**Primary Schools ICT teachers**

In 2013, ICT qualified teachers in primary and secondary schools constituted only 5 percent of total teachers (i.e. for every 100 teachers at both secondary and primary schools, there were only 5 ICT qualified teachers). The proportion of students who had access to the internet at schools stood at 47 percent in 2013, showing that for every 100 students only 47 of them had access to the internet, and in many cases with very limited access.

## 5.5 Secondary Schools – Junior (age 14-16)

The development of the Computer Awareness Programme for the Junior Community Secondary Schools was prompted by the recommendations made by the Revised National Policy on Education of 1994. The process of syllabus development was started with a consultancy which looked into the logistics to be considered in the development and implementation of the programme. The consultancy consulted widely and reached out to a variety of stakeholders. This is a programme which is designed to introduce the students to the use of the computer as a tool which helps to increase productivity by automating a lot of tasks undertaken in the world of work. The intention of the programme is not to produce computer experts out of the students but to give them the basic computer knowledge and basic skills to make them computer literate and enable them pursue computer studies without being intimidated by the computer.

The computer awareness programme is not a stand-alone programme but has to be infused into other subjects in the school curriculum even though this is not being enforced. Therefore it has been divided into global topics or modules as follows:
- computer skills
- keyboarding skills
- productivity tools:
- word processing
- spreadsheet
- databases
- graphics

The basic skills i.e. computer skills and keyboarding skills will have to be taught prior to the use of productivity tools. A time slot has to be created in order to accommodate this part of the Computer Awareness programme. The productivity tools will then be taught and used within other subject areas. These cannot be taught given a specified time but they are best learned through practice over a period of time.

Here Policies, Structures, Practices, Syllabus, challenges, and strength of the use of ICT in education of the following is reviewed and analyzed:

Refer to some of the core Computer Awareness Books recommended for Form 1, 2, and 3:

1. *Computer Awareness in Action, Form 1 Student's Book*, Mmatli Bushy,  Mpoeleng Dimane, Longman Botswana (pty) Ltd, ISBN  9789991246789, 2009
2. *Computer Awareness in Action, Form 2 Student's Book*, Mmatli Bushy, Mpoeleng Dimane,  Longman  Botswana (pty) Ltd,  ISBN 9789991266947, 2010
3. *Computer Awareness in Action, Form 3 Student's Book*, Book 3:  Brian Dill , Mmatli Bushy, Mpoeleng Dimane, Pearson  Botswana (pty) Ltd, ISBN 9789991293073, 2011

The question is: *are ICTs used in supporting other subject other than the ICT subset itself*? To answer the question a syllabus of the Junior Secondary schools was reviewed and each subject ICT use was answered YES or NO for whether ICTs are used to enhance teaching and learning in that particular subject or otherwise.

**Table 5.5: ICT use in Various Subjects – Junior Secondary:**

| Subject | ICT Use | Comment |
|---|---|---|
| Science | NO | |
| Setswana | NO | |
| Social Studies | NO | |
| Agriculture | NO | |
| Art | NO | |
| Commerce and Accounting | NO | |
| Commerce and Office Procedures | NO | |
| Computer Awareness | **YES** | Unfortunately not examinable therefore not compulsory. |
| DT | NO | |
| English | NO | |
| French | NO | |
| Home Economics | NO | |
| Music | NO | |
| Physical Education | NO | |

Junior Secondary schools are for ages of 15-17. These groups classified as Form 1, Form 2, and Form 3.  Out of the 14 subjects offered at junior secondary schools, only 1 is on ICTs education and it is not compulsory. That is none of the subjects at junior secondary schools do not use ICTs to support their teaching and learning activities.

## 5.6 Secondary Schools - Senior (age 17-18)

**BGSE Syllabus and Curriculum**

As a component of the Botswana General Certificate of Secondary Education (BGCSE) Programme, the Computer Studies Assessment Syllabus is designed to assess candidates who have completed a two year course based on the BGCSE Computer Studies Teaching Syllabus. This syllabus aims to assess positive achievement at all levels of ability and candidates will be assessed in ways that encourage them to show what they know, understand and can do.
Differentiation will be achieved by task and outcome rather than by tiered papers.

On completion of a two year Computer Studies Course Candidates should:

- be able to use computer systems for monitoring, controlling and decision making;
- have developed skills for use in research;
- have developed skills in using computers to store, retrieve and communicate information;
- have acquired knowledge and understanding about how computer systems work;
- have developed awareness of how computers are used in business, home and industry;
- have developed lifelong learning skills to be able to solve real life problems;
- have an understanding of a range of techniques and knowledge required in the use of computers;
- have developed critical and logical thinking , self-reliance and initiative which will serve as the basis for further training and positive work habits in the use of computers;
- As far as possible, the Aims will be reflected in the Assessment Objectives. However, some of them cannot be readily assessed.

Design and Technology is another subject that infuses ICT into the syllabus. Student should understand the application of ICD Design and Technology course. Students recognize that computer systems can control machines and equipment demonstrate an understanding of the uses of CAD/CAM in the manufacturing of single items, small batches and quantity. Other subjects were also reviewed and the syllabus was used to determine if ICT is used in the subject teaching and learning.

The table below summarizes the question whether ICTs are used in supporting other subject other than the ICT as a subject itself at Senior Secondary schools.

**Table 5.6: ICT use in Various Subjects – Senior Secondary:**

| Subject | ICT Use | Comment |
|---|---|---|
| 0561 BGCSE ENGLISH LANGUAGE | NO | |
| 0562 BGCSE SETSWANA | NO | |
| 0563 BGCSE MATHEMATICS | NO | |
| 0568 Science Single Award updated scheme of assessment for 2012 | NO | |
| 0569 Science Double Award updated scheme of assessment for 2012 | NO | |
| 0570 Chemistry updated scheme of assessment for 2012 | NO | |
| 0571 Physics updated scheme of assessment for 2012 | NO | |
| 0572 Biology Assessment Syllabus | NO | |
| 0572 Biology updated scheme of assessment for 2012 | NO | |
| 0573 BGCSE HUMAN - SOCIAL BIOLOGY | NO | |
| 0585 BGCSE SOCIAL STUDIES | NO | |
| 0586 BGCSE DEVELOPMENT STUDIES | NO | |
| 0587 BGCSE LITERATURE IN ENGLISH | NO | |
| 0588 BGCSE RELIGIOUS EDUCATION | NO | |
| 0595 BGCSE DESIGN – TECHNOLOGY | **YES** | |
| 0596 BGCSE ART – DESIGN | **YES** | |
| 0597 BGCSE COMPUTER STUDIES | **YES** | ICT subject itself |
| 0598 BGCSE COMMERCE | **YES** | Students identify the different ways computers and accessories are used in trading describe the importance of computers in trading. |

| | | Discuss the importance of computers in electronic commerce |
|---|---|---|
| 0599 BGCSE AGRICULTURE | NO | |
| 0611 BGCSE FOOD – NUTRITION | **YES** | |
| 0612 BGCSE FASHION – FABRICS | **YES** | |
| 0613 BGCSE HOME MANAGEMENT | NO | |
| 0615 BGCSE  BUSINESS STUDIES | NO | |
| 0616 BGCSE PHYSICAL EDUCATION | NO | |
| 0617 BGCSE MUSIC | **YES** | Students evaluate the effects of computers on the production and performance of music in the country |
| BGCSE Chemistry Assessment Syllabus | NO | |
| BGCSE PHYSICS Assessment Syllabus | NO | |
| BGCSE Science Double Award Assessment Syllabus | NO | |
| BGCSE Science Single Award Assessment Syllabus | NO | |

Senior Secondary schools are for ages of 17-18. These groups are classified as Form 4 and Form 5.  Out of the 19 subjects offered at senior secondary schools, only 7 infuse ICTs into their delivery. That is only 37% of subjects infuse ICTs into their teaching and learning activities.

## 5.7 Tertiary Colleges and Universities (age 18 and older)

Colleges and Universities schools are for ages of 18 and older.  At this level of education particular attention is paid to educating the teachers. How much ICT Literacy is imparted on a student teacher? This is crucial because the teacher graduates are expected to drive the ICTs in Education when they are assigned to various instructions at different levels as indicated above.

The good news is that besides penetration of internet and ICTs into modern society, all students at tertiary level are exposed to at least the basics of ICTs. Some universities in the country are dominantly ICTs such The Botho University, Limkokwing University of Creative Technology, and The Botswana International University of Science & Technology.

The University of Botswana, as the oldest university in Botswana and most diverse in terms of programmes offered, also enforces ICT teaching across the faculties and all students are enrolled into the basics of computing courses.  The university also has a dedicated department for ICTs pedagogical use called Centre for Academic Development (CAD).  The mandate of the Centre is to promote and facilitate the overall development of academic staff and students in the University, and offer appropriate advice and support to the University's Affiliated and Associated Institutions, thereby improving the academic quality, effectiveness and efficiency, and establishing an outreach for the institution. The center focuses on quality of course delivery through the use of ICTs and relevant teaching and learning technologies.

On the teaching of the potential teachers, the University of Botswana's faculty of Education has a department called Education Technology.  The department is a teaching department that trains education student teachers on the development and utilization of educational resources. One of the goals is to offer quality academic and professional programmes that ensure a commitment to and a mastery of life-long learning skills as well as encouraging a spirit of critical enquiry in the area of educational/instructional technology. Second**,** it aims at developing a student-centred, intellectually

stimulating and technologically advanced teaching, learning and research environment that is relevant to Botswana context and is internationally accepted. The third goal is to advance scholarship and generate research through the discovery, integration, dissemination and application of knowledge using Information and Communication Technology (ICT) where possible. Lastly, the department is committed to enhance the teaching, learning and research environment through provision of a proactive style of leadership and management, and efficient, effective and quality driven institutional support services.

But where the environment of schools that these students are graduated into is conducive for them to pass on the use of ICTs in education is another question.

## 5.8 Vocational Education and Training

Computer Training began in some Vocational Training Centres as early as 1990. Short courses were run for small groups using specific packages such as WordPerfect and Lotus 1-2-3. In 1993, syllabi of the various courses were drafted, in order to achieve a standardization of course content. It was also decided that a one year, full time Computer Operator course could be established by combining the part-time courses and enriching this content with other job related and computer subjects. This led to  Computer Operator course at Vocational Training Centers.

Computer Operator Course now runs at the following Vocational Training Centres: Gaborone, Jwaneng, Maun, Palapye and Selebi-Phikwe.  The Computer Sections of the VTC's in Jwaneng, Maun, Palapye and Selibe-Phikwe offer courses for clerical and secretarial students of the Commerce Departments of the respective VTCs. The Computer Laboratories of the Botswana VTCs are in use between 10 -13 hours per day, excluding weekends.

## 5.9 Private Secondary Schools

All private schools from Primary, through secondary, to tertiary use ICTs in Education as a selling point to parents and potential students. In Primary schools computer labs are used to support almost all courses taught at the school. Some private primary schools even use smart boards that can electronically record everything that is written on them for future replay.

Private senior schools have embraced the University of Cambridge International General Certificate of Secondary Education (IGCSE) ICT Syllabus of code 0417. It is only offered in private senior secondary schools, not in government schools.

The aims of the syllabus are to:

1. help candidates to develop and consolidate their knowledge, skills and understanding in ICT and be aware of new and emerging technologies;
2. encourage candidates to develop further as autonomous users of ICT;
3. encourage candidates to continue to develop their ICT skills in order to enhance their work in a variety of subject areas;
4. provide opportunities for candidates to analyze, design, implement, test and evaluate ICT systems;
5. encourage candidates to consider the impact of new technologies on methods of working in the outside world and on social, economic, ethical and moral issues;
6. help candidates to improve their skills and increase their awareness of the ways in which ICT is used in practical and work-related situations.
7. help candidates to improve their skills

The syllabus is structured around the flexibility needed to cope with a wide variety of resources and ever-changing technologies. Curriculum content is divided into eight interrelated sections which should be read as an integrated whole and not as a progression.

# 6.    ICT Infrastructure Survey at Selected Public Schools

Even though this work is supposed to be just a desktop study, The author conducted a survey on the use of ICTs in education in eleven (11) Primary schools, twenty (20) junior secondary schools, and five(5) senior secondary schools and the results Primary, Junior Secondary, and Senior Secondary are presented in Sections 6.1, 6.2, and 6.3 respectively.

## 6.1. ICT in Primary Schools (age 6-12)

The aim of the survey was to take a quick snap shot of the ICT practices at primary schools especially the availability of physical resources and infrastructure to support ICTs.  The picture, contrary to expectation, is worrying from a school lacking PCs, to PCs not on the internet or critically inadequate. In some primary schools there wasn't even a room to accommodate PCs.

The following Primary Schools were sampled across the country:

1. Boikhutso Primary School
2. Ithuteng Primary School
3. Kang Primary School
4. Kutlo Primary School
5. Mahusane Primary School
6. Magapatona Primary School
7. Maranyane Primary School
8. Newton Primary School
9. Reuben Primary School
10. Selebi-Phikwe Primary School
11. Timbi Primary School

Question asked at each primary school follow:

1. How many computers are at your school?
2. Are the computers networked?
3. Is the schools connected to the internet?
4. Level of ICT competency among students?
5. What operating system environment are you running?
6. Does your school use the computer lab to teach Math and Science? What applications?
7. Rooms available for LAN?
8. Physical security of the room?
9. Any video/presentation projector available?

**Table 6.1: Summary table of the ICT readiness in primary schools**

| # | Primary School | Enrolment | PCs | PC : Pupil ratio | ICT Teacher** | Networked? | Internet | Pupils ICT Competency | OS | ICT in Math and Science? | Room for LAN | Room Security | Projectors | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Boikhutso | | 9 | | Yes | NO | NO | Basic | | | Yes | NO | | |
| 2 | Ithuteng | | 7 | | Yes | NO | NO | Basic | | NO | Yes | Yes | | |
| 3 | Kang | | 4 | | Yes | NO | NO | Basic | | NO | Yes | Yes | | |
| 4 | Kutlo | | 5 | | Yes | NO | NO | Basic | XP | Mmusi Quiz | Yes | Yes | NO | |
| 5 | Mabutsane | | 32 | | Yes | YES | NO | Basic | | NO | Yes | Yes | NO | |
| 6 | Magapatona | | 15 | | Yes | NO | NO | Basic | Win7 | NO | Yes | NO | | |
| 7 | Maranyane | | 5 | | Yes | NO | NO | Basic | | Yes | Yes | Yes | Yes | |
| 8 | Newton | | 10 | | Yes | NO | NO | Basic | Win7 | NO | Yes | NO | NO | |
| 9 | Reuben | | 10 | | Yes | Yes | NO | Moderate | XP | Yes | Yes | Yes | No | |
| 10 | Selebi-Phikwe | | 14 | | Yes | NO | NO | Basic | XP | Only one | Yes | Yes | | |
| 11 | Timbi | | 10 | | Yes | NO | NO | Basic | Win7 | NO | NO* | Yes | | |

* Combined with Library.
** ICT teacher

## 6.2. ICT in Junior Secondary Schools (age 14-16)

Some Secondary Schools were also sampled and a questionnaire was issued out to University of Botswana library students who were sent out to various secondary schools across the country for their routine industrial attachment. The aim was to find out about the schools ICTs in Education practices and some questionnaires have already been filled.

The aim of this questionnaire survey was to take a quick snap shot of the ICT practices at secondary schools across the country. This questionnaire is expected to complement and validate the implementation of policy documents on the use of ICTs in education.

**Table 6.2: Summary table of the ICT readiness in Junior Secondary School**

| # | Junior Secondary School (JSS) | Town | District | Enrolment | PCs | PC : Pupil ratio | Networked? | Internet | Is your phone on the internet? | ICT Teachers | ICT Programmers* | Computer Awareness course actively taught? | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | |

| # | Name | Town | Region | | No. | | Col A | Col B | Col C | D | E | F | Comments |
|---|------|------|--------|---|-----|---|-------|-------|-------|---|---|---|----------|
| 1 | Batanani | Mapoka | N/E | | 25 | | YES | YES | YES | 1 | 1 | NO | Slow internet. ICT teacher overwhelmed |
| 2 | Gaborone West | Gaborone | Gaborone | | 28 | | YES | YES | YES | 2 | 1 | YES | |
| 3 | Goldmine | Francistown | N/E | | 20 | | YES | YES | YES | 1 | 1 | YES | |
| 4 | Gowa | Gumare | N/W | | | | NO | NO | NO | 1 | | YES | |
| 5 | Kgolagano | Middlepits | Kgalagadi | | 20 | | YES | NO | YES | 1 | 1 | YES | |
| 6 | Linchwe II | Mochudi | Kgatleng | | 25 | | YES | YES | YES | 2 | 1 | YES | No book copies for students |
| 7 | Maoka | Gaborone | Gaborone | | | | YES | YES | YES | 1 | | NO | |
| 8 | Marang | Gaborone | Gaborone | | | | NO | NO | NO | 1 | 1 | YES | |
| 9 | Moruakgomo | Molepolole | Kweneng | | 15 | | YES | YES | YES | 2 | 1 | NO | |
| 10 | Motaung | Kang | Kgalagadi | | | | YES | YES | YES | 2 | 1 | YES | |
| 11 | Motlhasedi | Tobane | Central | | 22 | | YES | YES | YES | 4 | 1 | YES | Very active |
| 12 | Motswaesele | Molepolole | Kweneng | | | | YES | YES | YES | 4 | 4 | YES | |
| 13 | Motswasele | Molepolole | Kweneng | | 2 | | NO | NO | YES | 1 | 1 | NO | |
| 14 | Nanogang | Gaborone | Gaborone | | 4 | | NO | NO | YES | 1 | 1 | NO | |
| 15 | Popagano | Maun | N/W | | 20 | | YES | YES | NO | 1 | 1 | N/A | |
| 16 | Rethuseng | Charleshill | Ghanzi | | | | NO | NO | YES | 1 | 1 | YES | |
| 17 | Sekgele | Thamaga | Kweneng | | 30 | | YES | YES | YES | 1 | 2 | YES | |
| 18 | Semane | Serowe | Central | | | | NO | NO | YES | 1 | | | |
| 19 | Sesholo | Tumasera | Central | | 10 | | NO | NO | YES | 1 | 1 | YES | Only one PC connected. No books no budget. |
| 20 | Thamani | Tshesebe | N/E | | 40 | | YES | YES | NO | 0 | 1 | NO | |

## 6.3 ICT in Senior Secondary Schools (age 17-18)

The Examinations Research and Testing Division (ERTD) developed the ICT syllabus for the Senior Secondary Schools as a subject called Computer Studies.

**Aims of Computer Studies Syllabus**

On completion of a two year Computer Studies Course Candidates should:
- be able to use computer systems for monitoring, controlling and decision making;
- have developed skills for use in research;
- have developed skills in using computers to store, retrieve and communicate information;
- have acquired knowledge and understanding about how computer systems work;

- have developed awareness of how computers are used in business, home and industry;
- have developed lifelong learning skills to be able to solve real life problems;

| # | Senior Secondary School (SSS) | Town | District | Enrolment | PCs | PC : Pupil ratio | Networked? | Internet | Is your phone on the internet? | ICT Teachers | ICT Programmers* | Computer Studies actively taught? | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Kgari Sechele | Molepolole | Kweneng | | 25 | | YES | YES | YES | 3 | 2 | YES | |
| 2 | Ledumang | Gaborone | South East | | 10 | | YES | YES | YES | | | YES | Option |
| 3 | Molefi | Mochudi | Kgatleng | | 22 | | YES | YES | YES | 1 | 1 | YES | Option |
| 4 | Naledi | Gaborone | South East | | 8 | | YES | YES | YES | 2 | 1 | YES | |
| 5 | Seepapitso | Kanye | Southern | | 35 | | YES | YES | YES | 2 | 1 | YES | |

- have an understanding of a range of techniques and knowledge required in the use of computers;
- have developed critical and logical thinking , self-reliance and initiative which will serve as the basis for further training and positive work habits in the use of computers;

**Table 6.3: Selected Senior Secondary Schools ICT Literacy - Survey**

Of the five(5) senior schools sampled, it is clear that most of them have a computer studies lab and all the five senior schools had a computer lab that is connected to the internet. This is similar picture across all the 27 secondary school in Botswana. The challenge is to utilize this ICT resources to support the teaching and learning support to other subjects other than ICT. This is confirmed by the previous chapter that almost none of the senior secondary schools subject benefits much from ICTs.

# 7.    Summary and Conclusions of the Study

This study compiled a documentation on good practices and cited lessons learned in the use of ICTs in education at different levels from early childhood, primary, secondary, higher education, inclusion, and adult literacy. The study went further to carry out surveys using questionnaires on the use of ICTs in education in some primary schools, junior secondary schools, and senior secondary schools.

## 7.1 Policies in place

Policies relevant to ICT in education have been clearly put in place, however they focus more on the ICT accessibility and availability of the basic resources such as computers in schools and internet access but they do not focus on the pedagogical significance and best practices of ICTs in other subjects in school.

## 7.2 Literacy

According to Statistics Botswana Literacy Survey of 2014, Botswana literacy rate is the highest in the world among the population aged 15 to 19 years (97.8 percent). Within this group, the male literacy rate was estimated at 97.6 percent, while the female rate was estimated at 97.9 percent.

## 7.3 Telecommunications infrastructure and penetration

Botswana has a robust telecommunications backbone infrastructure with billions of pulas already invested in major telecommunications fiber backbones. That infrastructure is also complemented by mobile phone companies in providing fast wireless technologies such as 3G and 4G. Another impressive statistics is Botswana has among the highest mobile phone penetration rate in the world at 1:2. That is two active cell phones per person. But the excellent infrastructure and high mobile phone penetration have not translated into the effective use of ICTs in schools because schools' connectivity and its cost remains a major challenge. Almost all primary schools in the survey did not have a computer lab with internet connection, while 8 out of 20 junior secondary schools did not have internet access.

## 7.4 Teaching of ICTs

Teaching of ICTs at primary schools is patchy, inconsistent, and not compulsory. Furthermore, none of the schools surveys used ICTs to enhance teaching and learning in other subjects. Teaching of ICTs at Junior Secondary schools is significantly more than at primary but still the Computer Awareness Course taught at junior schools is not compulsory. And in some schools, seven out of 20 surveys, the computer awareness course is not taught at all. Even more of a challenge is the lack of use of ICTs to support the pedagogy and delivery of other non ICTs subjects. In many schools this was minimal or non-existent. The worst use of ICTs is in primary schools, and followed by junior secondary schools, and ICTs are moderately used at senior secondary.  In the non-formal education sector, the use of ICT by the largest national non-formal education institute, BOCODOL, is mainly focused on service delivery such as online applications, but not for pedagogical activities of other subjects offered.

## 7.5 Education and Training Sector Strategic Plan (ETSSP)

The emergence of the Education and Training Sector Strategic Plan (ETSSP) for 2015-2020 provides the opportunity to provide a clear purpose and rationale for how the Thuto-net component of the national policy will be effectively integrated into the sector, including identifying opportunities, issues, challenges and strategies that will be employed.  This strategic plan remains the hope for the ministry of education to turn around the education sector through the full utilization of ICTs in teaching and learning.

# 8. IFAP Member States ICTs Literacy Policy Framework

IFAP Member States ICTs Literacy Policy Framework is herein summarized.

The recommendations are centered on the just approved Botswana Education and Training Strategic Sector Plan (ETSSP) for 2015 to 2020 that is designed to comprehensively and fundamentally transform education from pre-primary to tertiary level by the use of ICTs. The ETSSP puts a significant emphasis in the use of ICTs in education and the Government has linked the strategy to budget.

The following recommendations are mainly derived from the summary and conclusions of the study, and the already recommended programmes by ETSSP.

**Pedagogical framework**

The Ministry of Education is recommended to develop an ICT pedagogical framework that should be used at different levels from pre-schools to tertiary and special education.

**Schools Connectivity**

Provide all schools with high speed internet access of minimum 10 bmps.

**Integrate ICT in all subjects and levels**

The Ministry should Integrated ICTs into the curriculum of different subjects and across all levels from pre-schools to secondary schools.

**Capacity Development**

Take stock of teachers' skills and qualification and roll out training sessions for school teachers on the use of ICTs to enhance their teaching and delivery methods. An education and training system should be developed to support ICT integration in teaching and learning.

**Development and Availing of Content**

The ministry of Education should define and produce E- Content for Primary, Secondary, Vocational, and Tertiary levels and Open and Distance. E-Content should be consistent with the curriculum of the different subjects and difference levels. It should increase access of soft learning resources that are of high quality in all schools. The ministry should also make available electronic textbooks to all learners, Integration of e-books, interactive ICT resources, DVDs as well as learning resources for learners including learners with special educational needs such as Braille and other equipment.

**ICTs in Education research**

The Ministry of Education should establish a center of excellence of ICTs in Education that will support research and development of the pedagogy of ICTs. Further the center would disseminate platforms provided for repositories and management from objective data and analyses that help institutions to benchmark their research activities for the purpose of strengthening the quality and impact of research.

# 9. IFAP committee Schedule and Deliverables

The schedule for 2015/2016 and included weekend days as work days.

| | Task Description | Start Date | End Date | Duration (days) | Comment |
|---|---|---|---|---|---|
| N/A | Proposal and Work Plan | N/A | 15-June-15 | N/A | DONE |
| 1 | Introduction | 16-June | 17-June-15 | 2 | DONE |
| 2 | ICT literacy related work | 18-June | 20-June-15 | 3 | DONE |
| 3.1 | Identification of Existing Relevant Reports | 21-June | 25-June-15 | 5 | DONE |
| 3.2 | Review of the Reports | 26-June | 30-June-15 | 5 | DONE |
| 3.3 | Relevant Statistics in the ICT Infrastructure and Cost | 1-July | 3-July-15 | 3 | DONE |
| 3.4 | Non-Formal and Adult Education (age 13 and older) | 4-July | 5-July-15 | 2 | DONE |
| 3.5 | Education to People of Disabilities | 6-July | 7-July-15 | 2 | DONE |
| 3.6 | Pre-Schools (age 0-5) | 8-July | 11-July-15 | 3 | DONE |
| 3.7 | Primary Schools (age 6-13) | 12-July | 14-July-15 | 3 | DONE |
| 3.8 | Secondary Schools (age 14-18) | 15-July | 17-July-15 | 3 | DONE |
| | **FIRST DRAFT** | **18-July** | **18-July**-15 | **1** | DONE |
| 3.9 | Tertiary Colleges and Universities (age 18 and older) | 19-July | 22-July-15 | 4 | DONE |
| | | | | | DONE |
| 4 | Survey at Selected Public Schools | 23-July | 26-July-15 | 4 | DONE |
| 5 | Other ICT in Education Practices may need more days here | 27-July | 29-July-15 | 3 | DONE |
| 6 | Summary and Discussion of Findings | 30-July | 1-Aug-15 | 3 | DONE |
| 7 | Conclusion | 2-Aug | 2-Aug-15 | 1 | DONE |
| 8 | ICT Literacy Policy recommendations | 3-Aug | 3-Aug-15 | 1 | DONE |
| 9 | Draft Final Report | 4-Aug | 6-Aug-15 | 3 | DONE |
| 10 | **Review IFAP Committee member** | 7-Aug | 8-Aug - 15 | **2** | DONE |
| 11 | **Final Report Preparation** | 8-Aug - 15 | 8- April - 16 | **300** | DONE |
| 12 | **IFAP 9th Sessions meeting** | 20-May-16 | 30-May-16 | **2** | **UP-COMING** |
| | TOTAL | | | | |

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| | |
|---|---|
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| www.bec.co.bw | BEC |
| www.bih.co.bw | BIH |
| www.bocodol.ac.bw | BOCODOL |
| www.bocra.org.bw | BOCRA |
| www.bofinet.co.bw | Bofinet |
| www.botsnet.bw | BotsNet |
| www.bota.org.bw | BQA |
| www.btc.bw/ | BTCL |
| www.bothouniversity.ac.bw | BU |
| http://www.unesco.org/webworld/ifap/ | IFAP |
| www.finance.gov.bw | MFDP |
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| http://www.gov.bw/en/Ministries--Authorities/Ministries/Ministry-of-Education-MoE/ | MoESD |
| www.tec.org.bw | TEC/HRDC |
| www.ub.bw/ | UB |
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