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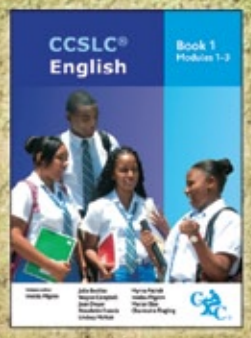
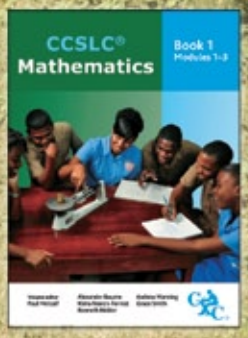
p10

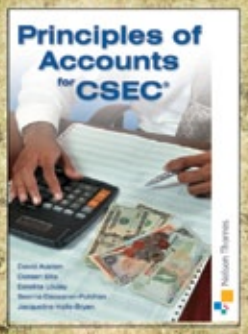
CXC IN THE CLOUDS

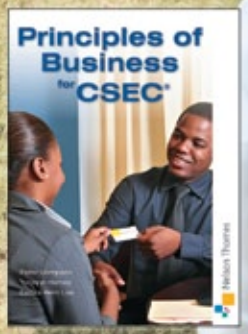
CXC: AN 'IT INTELLIGENT' ORGANISATION

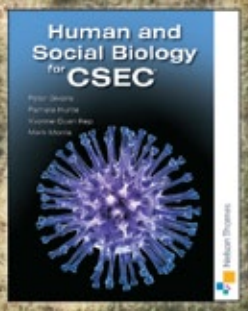
Nelson Thornes leading titles for 2011

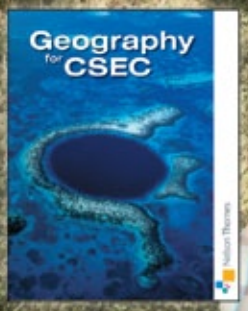












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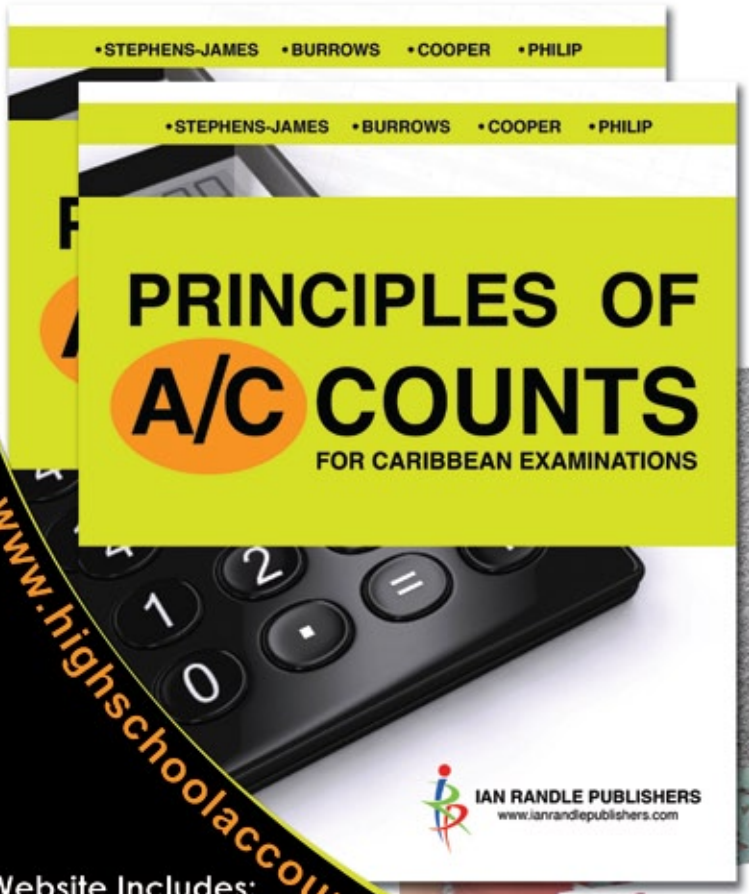

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CXC: An 'IT Intelligent' Organisation

CXC News

ABOUT THE COVER

The Information Systems Division (ISD) is the digital nerve centre of CXC. The division is leading the charge to transform CXC into an IT Intelligent Organisation, as e-learning and ICT become more important modalities in the delivery of education.

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IT EXCLUSIVE SECTION

IT INTELLIGENCE: MORE THAN GADGETS

By Rodney Payne

The Caribbean Examinations Council refined its strategic intent in 2008-2009. The creation of an IT Intelligent Organization became one of the new strategic goals. In keeping with the new mandate, a significant amount of funding was allocated to accelerate the technology refresh cycle. Included in the refresh, was the retooling of the Information Systems Division (ISD). The first project undertaken was the Unified Communication System (UCS). This harmonized inter-office communication and was followed closely by our virtualization project. The modernization of the printery, the deployment of several new applications for collaboration, records and archiving, examinations administration, human resource and financial management were all part of the advancement in the refresh cycle.

At the same time we were deploying the new technologies, the ISD Team was reorganizing itself to better support the shifting paradigm. Prior to 2001, ISD provided mainly Computer Operations Support for the administration of examinations. This included data management, reporting, printing services and the operation of centralized computing. Starting in 2001, with the redesign of the Examinations Processing System (EPS) the role of ISD began to change. The EPS was fully deployed for the 2004 May-June sitting and the decentralization of computer operations had begun. By 2010,

IT Intelligence: more than gadgets

aided by the accelerated IT refresh cycle and the new vision, our end-users had been significantly empowered, particularly our Examinations Administration and Security (EAS) and Examination Development and Production Division (EDPD) colleagues, such that many were asking "what will ISD be doing now?"

Having empowered our user community, Team ISD found life even more hectic! Computer access which may have been 'nice to have' four years ago, became essential. The UCS brought instant communication services and any outage demanded an 'instant fix'. Collaboration, now dependent on the availability of the Internet, elevated Internet access to the 'essential services suite'. With the introduction of remote access and extranet services, our office hours are no longer 8:15am–4:30pm, Monday–Friday. Seemingly in the minds of our clientele, our new office hours were 'any time' in the 24-hour-day-of-the-week. One of our users recently remarked, "I was trying to get somebody for the last hour but nobody answered my call". The remark was being made at 5:15am!

So, how have we been managing the gadgets? Are we becoming an IT Intelligent Organization? Have we improved our operating efficiency? Are we meeting our customers' expectations? Are we delivering a high quality service? **TABLE 1** highlights some of the land marks over the last three years:

The journey has by no means been completed. However, as an organization, we are certainly more aware of the benefits of the application of information technology. We have begun to see positive returns on our investments, **and our thinking is changing**. ISD no longer has to do all the pushing; our colleagues are **recognizing bottlenecks and are requesting interventions**. In keeping with the process review of core services and the IT function completed late last year, **CXC** continues to embrace IT solutions which improve our efficiency, enhance the quality of our product and assist us in meeting our customers' demands.

Our Quality Policy states: "*The Caribbean Examinations Council is committed to being a* ***world leader*** *in the provision of* ***examination products and services*** *which meet established educational, psychometric and professional standards, and* ***exceed our customers' expectations***". ISD in supporting this thrust has been working to strengthen its policy framework. We have begun to document processes and procedures. The Information Technology Infrastructure Library (ITIL v3) framework for service management has been agreed upon and we are working on the implementation strategy. Our staff training programmes continue as quickly as resources will permit. Formal and informal customer surveys have been introduced and the feedback utilized to improve our delivery. Further, taking onboard the guidance of the process review consultants, we continue to re-organize our roles to best deliver a high quality IT service. Recognizing the vital role IT plays in the functioning of the organization, **we strive for uninterrupted service**, save planned maintenance windows.

With an 18 month cycle between release and obsolescence, our IT strategy needs to be carefully married to business objectives. **CXC**'s core business is delivering **examinations products and services**; IT will be an enabler. We cannot always drop in an application or swap out a machine at our customers' behest, but, we are committed to the IT Service Level Agreement (SLA) ratified in February 2011, and the organization's strategic and transformation agenda. Team ISD will continue the journey and, as best we can, clear the path through the 'technology cloud'.

TIMELINE	EVENT	CUSTOMER IMPACT
SEPTEMBER 2008	Acceleration of the technology refresh cycle	Investment in technology doubled, new technologies in EDPD, proliferation of mobile devices, redefined IT strategic vision.
MAY 2009	UCS fully deployed	Reduced cost of inter-office communication. Improved collaboration and decision making.
JUNE 2009	Virtual infrastructure deployed	More robust infrastructure. Reduced time to deploy IT services.
AUGUST 2009	Printing of results through the new printing technology	Reduced time to complete printing of results. Improved customer satisfaction with the enhanced appearance of the laser printed reports.
SEPTEMBER 2009	Extranet collaboration tools deployed. **www.cxc.org/docushare**	Secure interaction with external parties including Ministries of Education. Reduced time to deliver reports.
DECEMBER 2009	Secure remote access available.	**CXC** staff able to securely access resources while on assignment away from the office. More flexible office hours.
FEBRUARY 2010	Markers Portal and Administration Application upgraded. **www.cxc.org/markers**	Potential examiners could register directly with **CXC** for inclusion in marking exercises.
MAY 2010	Web site redesigned and launch. **www.cxc.org**	More interactive site, content updated regularly. Social networking incorporated.
JUNE 2010	EAS and EDPD take over processing of examinations.	Empowered users, improved scheduling and delivery of results. Coupled with the availability of remote access, persons were no longer spending extended hours in office.
SEPTEMBER 2010	Registration application hosted remotely. ors.**cxc**.org	Improved performance. Cleaner registration process.
DECEMBER 2010	New HR application deployed	Staff handling HR transaction directly including updating personal information.
MARCH 2011	Online processing of requisitions and purchase orders.	Faster delivery of services, more efficient procurement process.
JULY 2011	E-payment to 80% of our examiners.	Full utilization of the markers portal improved efficiency in administration of May/June marking and grading exercises.
AUGUST 2011	Online delivery of results to Candidates.	

Rodney Payne is the Senior Assistant Registrar of the Information Systems Division at **CXC**.

CXC® IN THE CLOUDS

By André Blair

There are many times while travelling that I ponder a thought, and wondered why we don't capture some clouds and put them in a jar. Do what with it you may ask. I am not sure, but I figured some other great minds will run with the idea and create something fabulous. So you can imagine when I heard about cloud computing what was going through my mind: "finally someone grabbed hold of my idea." Yeah, I am still waiting on the royalties.

What is your definition or view on this phenomenon? Do you think they have placed some cumulus clouds into a computer to improve its performance? Or do you think they have placed computers in the cumulonimbus clouds far in the sky where we cannot see them? Both far-fetched scenarios you may argue, but mankind has placed satellites in orbit, and has restricted electricity into small chips. So utilizing the clouds in technology cannot be that far fetched after all.

Let's look at a definition of the term 'cloud computing'. According to Wikipedia, cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software and information are provided to computers and other devices as a utility (like the electricity grid) over a network (typically the Internet).

Is cloud computing really new? In my opinion, it's just a new word for working remotely. Normally, an organization would have its employees outfitted with a PC (personal computer), connected to a network and running business centric applications. However, in this new paradigm, the business applications are moved offsite to a remote location and accessed by the user. Notwithstanding, some applications are replaced by other services provided remotely. For instance, instead of using MS Works, Google Docs is being used which also enables sharing of documents with specified users. We see the use of web services such as Flickr, Google Docs, Jing (video screen capture service) to perform the functions that were traditionally done with software installed on an individual computer.

Wouldn't it be nice if you went outside and saw **CXC** written in the clouds? You won't be seeing the writing in the clouds, but it's still great news that **CXC** is *in* the clouds. We are utilising a type of cloud computing called infrastructure as a service. Instead of investing large sums of money into our local office network infrastructure, we have rented that infrastructure from a supplier somewhere out there. Yes, we have become tenants in another man's yard (the cloud no less), which is the concept of this new technology.

There are significant gains for **CXC** going this route; not only do we save money, but performance on applications has improved. Reduced cost occurs as the technology is paid for incrementally, whereas, in- house purchases tend to be made with lump-sum payments.

Replacement or upgrades of newly-bought hardware and software would cost more than to obtain the infrastructure service. While in life everyone prefers to possess his own things (own his house as oppose to renting), the reality is that it is more cost effective to rent this service than to own it. Reduced cost, though in some cases is quite minimally, can also be seen as electricity is conserved from not having to power the servers, or provide the air conditioning needed to cool the systems.

Accessibility to increased bandwidth is another tremendous advantage for this cloud computing methodology. With the in-house system, in order to improve performance on some applications, additional Internet bandwidth has to be purchased; Internet bandwidth in the Caribbean is not cheap. Therefore, the cost for the complete cloud infrastructure service is a more cost-effective option. The increased bandwidth this service provides enables multiple users to gain access to business applications at the same time without interruption.

Picture yourself on a beach with a pina colada in one hand and your laptop in the next. Or maybe you are simply at home on the couch looking at television, while of course using your laptop. Cloud computing provides flexibility and ease and is predicated on the notion that users can work from anywhere. Cloud computing is location independent. It provides mobility, wherein it enables users to access systems via a web browser, even without their own computers and independent of what device they are using (whether a PC, or mobile phone). Users can connect and work from anywhere in the world as long as Internet is available. You can take your work with you on your wedding, cruise, and vacation.

Maintenance of applications is made easier as well. Updates and upgrades of an application do not need to be done on each user's computer, but rather once updated in the cloud, they will be rolled out to the users instantaneously. The time spent in IT support due to maintenance purposes will be reduced, and as a result a shift emerges in the IT focus as more time can be spent resolving other user issues and providing high availability of systems throughout the organisation.

Security is also improved since data is centralised and focus is given to one area as opposed to multiple areas. The IT staff from within in the organisation provides monitoring of the data and servers, but the security process is heightened as providers of the infrastructure service also devote resources to monitoring and resolving security issues.

"The sky is falling! The sky is falling!" for those of you who can remember Chicken Little. In this case, it's the cloud which is no longer something way out there, but very close to us. Cloud computing is an extension of IT services that occur in real time via the Internet. It is technology all organisations should seek to utilise to remain current and on the cutting edge. **CXC** is in the cloud.

André Blair serves as Assistant Registrar in the Information Systems Division at **CXC** *providing Database Administration and Software Development services.*

POWER IN YOUR HANDS

Mobile Technologies and e-Learning

By Sheldine Robinson

The world has gone mobile. Everything is mobile; from games to music to videos, live television, photographs, downloads of all kinds. It's the daily norm for users and owners of what was once only known as a cell phone. Today, with the advent of fast-developing technologies, the mobile device has evolved from being simply a phone into a robust innovation tool. It is a way to access the Internet on-the-go, and a conduit for the ever-expanding universe of mobile applications.[1]

Mobile connectivity is helping us break free from the home-to-office and workplace mentality that works stops when there is no physical building or wires. This technology affords you the opportunity to be a constant, 'always on' resource. The increase in smart phones has put PC-like capabilities and connectivity in the palms of our hands. We are walking around with the Internet in our pockets, at our fingertips, with the ability to stay connected anytime from anywhere; all you need is a Wi-Fi connection.

So what are we waiting for? We have banned cell phone use in the schools. Why? Because (*and I always tell my children never to start sentences with because* ☺), they are seen as an unnecessary evil, as distracters rather than enhancers. We have heard of all the negative things that cell phone use brings to the school system, but have we taken enough time to explore the benefits? This article is not supporting misuse and abuse of the technology within the school system, but rather, it is geared towards seeking new and innovative ways for the tool to be incorporated into and used effectively to promote a culture of learning.

It would be a challenge for educators and designers to understand and explore how best learning can be channelled in the right direction without causing interruptions to the curricula.

The onset and continued fast-development of new technologies and devices can be used to motivate students for learning. Mobile learning is known to be a rich, collaborative and conversational experience and is not limited to time, space or geographical location. Students embrace the ability to interact with and learn in their own personalized network space with cutting-edge technology, communication and collaborative tools.

One online article refers to children/students of the cell phone era as "digital natives" and their teachers/instructors as "digital immigrants". Unfortunately, the two operate in different worlds, hence the disconnect in the classroom. This is by no means the fault of either party; it is simply that eras and environments have changed.

Digital Immigrant instructors, who speak an outdated language (that of the pre-digital age), are struggling to teach a population that speaks an entirely new language.[2]

The **CXC** has reached a place where our data and databases are stored in the "cloud". More and more of our applications are web-based and fit perfectly into the scheme of mobile accessibility. We are ripe for taking advantage of the technological advances, ridding ourselves of the status 'digital immigrants' and becoming 'natives' ourselves.

No matter how much the Immigrants may wish it, it is highly unlikely the Digital Natives will go backwards. Kids born into any new culture

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1 http://www.mobilefuture.org/issues/archive/mobile_ability?/mobileability
2 http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf
3 http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf
4 http://www.thedailybeast.com/cheat-sheet/item/mobile-device-use-rising-in-schools/clicker-class/

Power in Your Hands

learn the new language easily, and forcefully resist using the old. Smart adult immigrants accept that they don't know about their new world and take advantage of their kids to help them learn and integrate. [3]

All across the world, students and teachers alike have learnt to incorporate the two worlds; we can too in the Caribbean. Mobile companies are advancing cell phone user's potential by rapidly developing applications. This was vastly appreciated when the common social networks were only a click away with guaranteed connection to friends and family. With Face book, You-tube, Instant Messaging, image and media sharing, life seemingly never gets boring.

CXC has contributed greatly to the educational thrust in the Caribbean and intends to continue by embracing novelty ideas integral to learning. It will also form part of our strategy to becoming a world-class and IT-intelligent organisation. We have the capacity and expertise to add our "voice" and a Caribbean flavour to mobile app development.

In universities and high schools across America, more than half a million students are using handheld mobile devices in class to register attendance, respond to opinion polls, take quizzes, and anonymously register confusion during lectures using an application called "Clickers".[4] These "clickers" automatically clock students in as "present" as they enter the classroom. There are also numbered buttons on the devices to answer multiple-choice quizzes that count for nearly 20% of their grade. Students can also get their teacher's attention by using the "clicker" without having to raise their hands.

Let's make learning fun-on-the-go by developing our own mobile apps to do some of the following;

- Offer quizzes, sample preparatory **CCSLC**, **CSEC** and **CAPE** tests.
- Offer an incentive to the student completing the tests in record time.
- Deliver rich educational content as a means of communicating, collaborating and supporting exciting new learning opportunities.

This list is by no means exhaustive. It is amazing the things we can do and the places we can go just by delving into the mobile world. It is definitely tomorrow's future and the cell phone will continue to play an even more crucial role in our lives. Use it; it puts the power in your hand.

Sheldine Robinson is the Junior Systems Administrator at **CXC** *and is pursuing a Masters in E-Commerce at UWI.*

BENEFITS OF A SERVICES FRAMEWORK ITIL V3

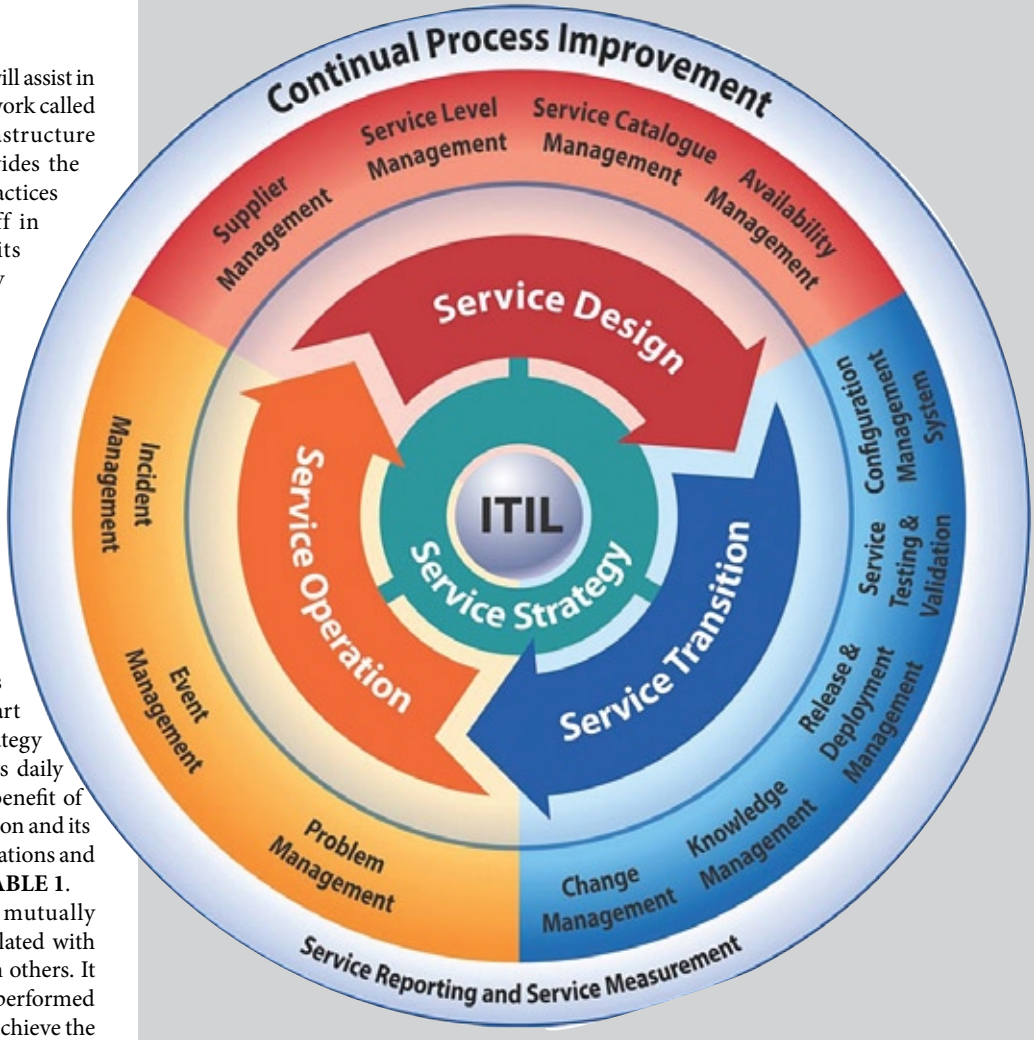
By Keone James

CXC has embarked on a strategic objective which seeks to create an environment conducive to becoming an IT-intelligent organisation. Key to this objective is the provision of a secure, stabilised IT infrastructure that supports the organisation in becoming efficient and effective in its daily activities and one which will take the organisation to the next level.

One of the major thrusts which will assist in creating this environment is a framework called the Information Technology Infrastructure Library (ITIL) version 3. ITIL provides the doctrine of IT international best practices which enforces and guides IT staff in providing quality IT services to its stakeholders. This is achieved by ensuring that IT services that are beneficial to the organisation are planned and strategised, with a design developed to pinpoint the transitional process for the execution of the service. Built into this is a feedback mechanism that provides a means of analysing and improving on the service when required. This is indeed one of the major benefits of ITIL, guaranteeing improved IT service every time.

The Information Systems Division (ISD) has embarked as part of their 2009 – 2011 divisional strategy to include the ITIL framework in its daily routine, thus providing the overall benefit of improved IT services to the organisation and its stakeholders. Some of the implementations and benefits to be derived are listed in **TABLE 1**.

The activities above are not mutually exclusive, but are very much interrelated with some activities depending heavily on others. It is indeed critical that all activities are performed correctly, following best practices to achieve the desired result.



Benefits of a Services Framework ITIL v3

"ITIL PROVIDES THE DOCTRINE OF IT INTERNATIONAL BEST PRACTICES WHICH ENFORCES AND GUIDES IT STAFF IN PROVIDING QUALITY IT SERVICES TO ITS STAKEHOLDERS."

Two of the major accomplishments related to ITIL which have been implemented are the Service Level Agreement and the IT Service desk. The IT Service Level Agreement serves as the guide which enforces what IT services are supported, how they will be supported and the expectations from both the IT division and its stakeholders in ensuring the resolution of IT requests. The IT Service Desk provides the mechanism for users to interact with the IT team in a systematic way, placing their IT request in an orderly fashion with the expectations of a resolution according to what has been outlined in the IT Service Level Agreement.

The overall impact of the ITIL framework to ISD and by extension **CXC** can be seen as monumental, in that it ensures that IT services provided to the organisation are of the highest quality and meets international standards. The continual improvement mechanism which allows stakeholders to critique performance with the benefit of improvement can only do well for the organisation. ISD is still in the embryotic stages of implementing the framework. There is still more to accomplish and achieve, but we do believe we are well under way to providing our stakeholders with impeccable service and satisfaction which will allow them to perform their duties with effectiveness and efficiency.

Keone James is an Assistant Registrar in the Information Systems Division at **CXC**.

ITIL ACTIVITY	BENEFITS TO THE ORGANISATION
SERVICE LEVEL AGREEMENT	This document serves as a formal mechanism which outlines • what services will be performed, • how they will be performed, • the length of time taken to perform the action and • what should be done if the performance is not met. It further provides a guideline and understanding of the expectations of both parties, outlining what is expected of the IT Staff and the stakeholder requesting the service.
POLICY DOCUMENTS	Important to operating within the standards and framework of an efficient IT department is • the design of a Security policy document which outlines the security measures that must be taken to protect IT systems and unwanted illegal tampering of devices. • a network policy which governs what can be used on the network and how it should be used. • a Contingency Disaster Recovery Plan which provides a backup strategy in the event of a disaster - how would the organisation recover to a state where it can function effectively.
INCIDENT MANAGEMENT	Allows for the management of reported incidents where users can identify IT incidents which may arise, have them classified, recorded, resolved and analysed. The analysis would be used to identify how these incidents can be reduced. This activity is automated via the IT Service Desk and links with the Service Level Agreement to ensure that incidents reported are completed within the agreed time.
CHANGE MANAGEMENT	Change is inevitable and will always exist. We have to prepare for change in a formal manner. This requires • documenting the change, • stating the reason why these changes are necessary, having the change approved • identifying how this change will occur. Documentation and management of change is critical for persons to understand where we were, where we are going and why we are embarking on what we are doing. Critical to this activity is the development of a Change Management Board which will govern all major and critical IT changes which are required.
KNOWLEDGE MANAGEMENT	This allows for the identification or creation of knowledge which can be distributed among individuals. We have embarked on two solutions: **Configuration Database** Retains the configurations of IT systems which will allow for the IT department to easily troubleshoot and resolve issues in a faster and efficient means. This is ideal in the event of disaster recovery where systems can be recovered to their original state. **Knowledgebase** Allows for the spread of knowledge and will influence the organisation to become IT Intelligent. Known issues are updated in the system and will be shared with all depending on the complexity. It allows persons to research known issues and utilise the solutions which have been provided to resolve the problem they may be experiencing.
CONTINUAL SERVICE IMPROVEMENT	Critical and important to an organisation's improvement of itself is understanding how it is performing and what it needs to do to improve itself. This is obtained through both qualitative and quantitatapproaches. These would include • the collection and analysing of data on performance, • identifying where issues occur, • and implementing mitigating measures to improve on the service. The use of surveys and having dialogue with stakeholders is another alternative used to gather feedback and utilise ideas to improve the services offered.

A NEW HORIZON

By Danielle Reeves

What an exciting time to join the **CXC**/ ISD family! With the Council's reinvigorated emphasis on utilising technology, it's all hands on deck, while enjoying a thrilling ride through the new age. Starting out as a college graduate with more enthusiasm than experience, I've since grown both as an IT- professional and an individual. And such growth is to be expected in a division with a strong belief in shared knowledge, and a healthy team spirit. Here are two areas in which the team seeks to continually improve, which will aid our future success as an IT intelligent organization:

KEEPING UP WITH TECHNOLOGY

The IT industry is perhaps one of the most dynamic industries existing today. As such, keeping up with the many advances in technology requires a significant amount of time and research. Failure to keep abreast with the latest technologies can leave individuals out of the loop, and organizations at a significant disadvantage to their competitors. In fact, many of the advances in hardware devices and software applications come about as a means to fixing inefficiencies, streamlining processes or just making things less complicated, underlining the role technology plays in gaining competitive advantage.

In such an industry, it is therefore both necessary and prudent to pay more than the usual attention to news as IT persons project it, through blogs, vlogs, forums and other online communities. In ISD, countless hours are spent researching topics, applications and equipment in order to gain greater understanding of the requirements, benefits and potential complications. Examining the feasibility and practicality of the technology, before any concrete decisions are made is vital to avoid mindlessly forging ahead. ISD has certainly proven to have benefited from doing this. As we implement new technologies and constantly impress both our internal and external customers, we also improve the efficiency of many of our processes.

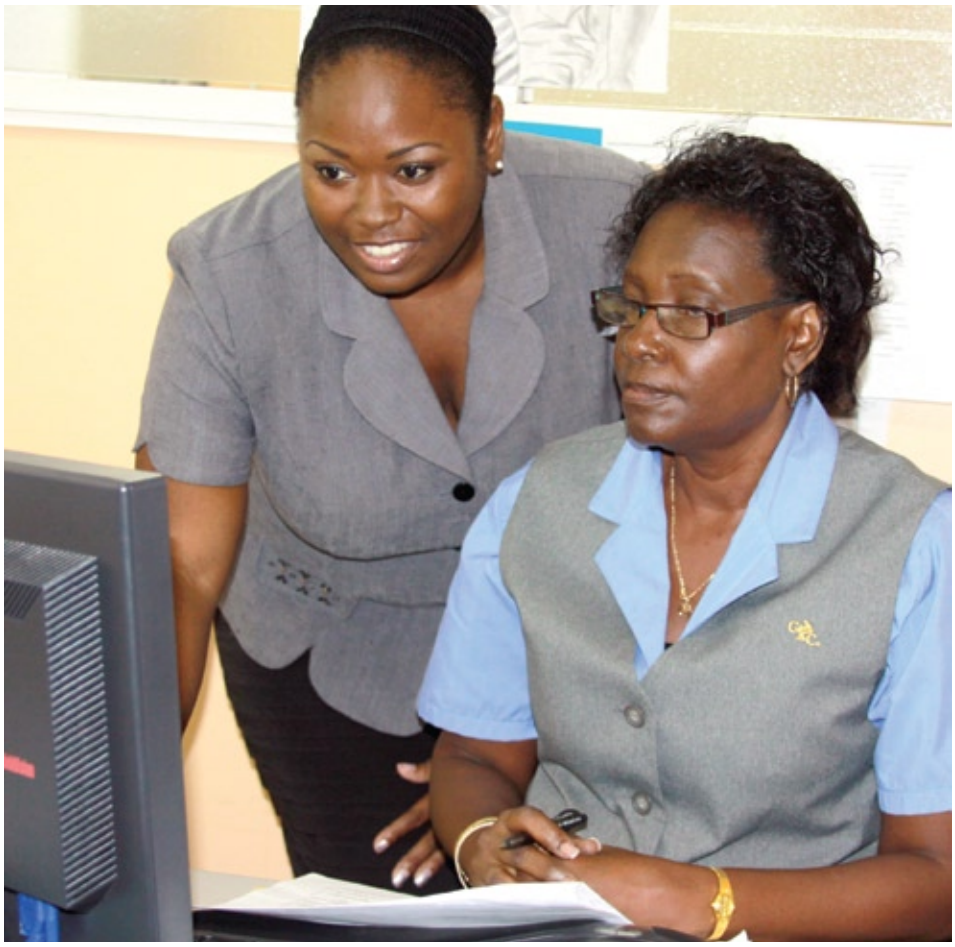
An excellent example of such a process is that of the data capture exercise used in the marking period, affectionately labelled BEHIVE. On hearing others recount the tales of this process in the past, with its extremely complicated procedures, and round the clock shifts, BEHIVE instilled nightmares. However, as it has been gradually refined with the introduction of new devices and smoother, simpler activity flows, BEHIVE is significantly less fear- inspiring.

EMPOWERING OUR USERS

As an organisation seeking to become IT intelligent, it is vitally important that users have a positive mindset towards technology, and use it to help themselves. This at times can be particularly challenging, but definitely not impossible. A key point is to demonstrate how using a new software program, or piece of equipment can make things easier, if not better for the user. Additionally, proper training is a must, to help build confidence in using the new technology, as well as to enable a real difference in performance.

ISD actively engages our users in determining their needs, in order to produce IT solutions that they can get excited about. These solutions may include users being able to work without a heavy reliance on others, including the ISD team, thereby empowering the user. Interactive and stimulating training sessions and workshops help serve to fully cement understanding of the solution. In this way, both ISD and our users are moving hand in hand, striving forward towards a new horizon of technological advancement and efficiency.

Danielle Reeves is the User Support Coordinator (Temporary) in the Information Systems Division.



Danielle Reeves (left) assisting Ingrid Lovell of the Examinations Administration and Security Division

FROM ROUTINE TO THE UNKNOWN... AND LIKING IT!

By Debbie Haynes

"MY ROLE AS WELL AS MY FOCUS HAS CHANGED TREMENDOUSLY SINCE THIS TRANSITION. IT WAS TIME TO RETOOL."

What do you think when you see parts of your job being given to someone else? Do you feel a sense of insecurity? Do you feel scared? Do you ask yourself "what will become of me?" "Should I be looking for a new job?" These are some of the questions that invaded my mind as the Information Systems Division (ISD) was being transformed from a data operations division into an Information Technology service division.

The organisation was going through a transformation and ISD was a major part of it. Bit by bit, the duties of an Operator were being handed over to the Examinations Administration and Security Division and Examinations Development and Production Division (EDPD). These included operational tasks such as Registration, Scoring and Grading. These were all tasks for which I was responsible. (i.e capturing of data, processing of data and printing of results). The changes were happening just as quickly as the fear of the unknown was creeping into my psyche.

But when one conquers one's fears, one feels free. It was not that my job was going anywhere, but rather, the role in the division was changing from routine to strategic. As such, my role as well as my focus have changed tremendously since this transition. It was time to retool. As of February 2010, I was temporarily assigned as an IT Technical Writer/Project Support within the division. This role is two-fold and it keeps me on my toes!

I am now responsible for ensuring that all documentation of procedures and work instructions in the division is current. This involves working with the Development and the User Support team to develop test plans and also to refine documentation prior to publication. Documentation is very critical to any organisation, and it is the first step in building an effective system.

As an IT service division, ISD ensures that our users are provided with information and guidance when using new applications. The technology changes rapidly and the documentation requires constant updating to remain current. If procedures and work instructions are not documented then there will be variations in the process. The goal here is consistency and standardisation in the way things are done.

Part of my new role now is to provide project support to the Business Analyst. This is a new area of knowledge for me which I have embraced with opened arms. The area of project management is very important and the objective is to ensure that all projects are aligned with the strategic goals and objectives of the organisation. This role has allowed me to utilise the theory which I am gaining from being enrolled in the MSc. in Project Management at UWI. So far, I have worked with the HRMIS project and am currently providing project support to the Caribbean Primary Exit Assessment (CPEA).

Another strategic role I play now is to assist the ISD team in developing its policy framework to align with the goals of the organisation and the thrust towards ISO 9000 certification. As one of the 'Quality Champs' within the division, I provide support in leading the ISO 9000 initiative for the division.

I also have to keep abreast of the latest technologies being deployed within the organisation as I am required to perform user support activities when the need arises.

Change is inevitable and I have learned to embrace it. By nature we are resistant to change, because we are comfortable in our old routine and afraid of the unknown. But change will happen, and we should anticipate change, monitor change, adapt to change quickly, change and enjoy the change.

Debbie Haynes is an IT Technical Writer and Project Support in the Information Systems Division of **CXC**, *and is pursuing a Masters in Project Management at UWI.*

FROM OFFSET TO DIGITAL PRINTING

By Frankey Worrell, Noel Stephens and Charlie Vanderpool

IN THE BEGINNING

Thirty-one years ago when I (Frankey Worrell) entered **CXC** as a Printer/Draughtsman, printing in the organization was in its infancy. In fact, there were two Gestetner machines for printing Gestafax stencils; one AB Dick printing press and a smaller table top model for printing plates: subsequently a Heidelberg MO and Guillotine were added.

The old Heidelberg

Everything was done manually in those days. The work load would vary from day-to-day and when printing was not in demand preparations of graphics would come into play. There was never a dull moment as there were several processes that were involved in getting the job done and ready for delivery. As time went on a few more pieces of equipment were added, camera-ready copies or masters were prepared. Negatives were produced using the NuArc camera; films were developed using the Devotec Film Processor. Images were transferred to plate using the Plate Burner. The final output would be through the Plate Processor where the plates would be cleaned and gummed for printing. These processes were time-consuming and involved different chemicals at various stages.

The printing process entailed, inking the press, adding fountain solution, loading appropriate paper stock, checking print quality registration. At the end of a printing job, it was very satisfying, albeit time consuming, knowing praise would be heaped on you for a job well done.

In 2009 a new dawn engulfed the Printery. It was the advent of digital printing. The emotions were mixed. Excitement and sadness enveloped the atmosphere as saying goodbye to the old and embracing the new brought back nostalgic moments; letting go was hard.

DIGITAL RETOOLING

The Council had invested in a new digital suite of printing equipment in partnership with Barbados Business Machines Limited and Xerox. Retraining and retooling were the order of the day, an absolute necessity. The first step was for a three-member team comprising the two Printery staff and the in-house Graphic Artist to go to Xerox Knowledge Centre in Washington DC for training in the digital experience.

The training took place in June 2009 and lasted for 10 days. Training was done on the High Light Colour 128 press, Docu Colour 8000 and the Free Flow Make-Ready Programme.

The training was intense. It was the first time the team members were working on the Make Ready programme which gives the operator the ability to set up documents, to insert photographs, amend pages and texts, highlight text in a PDF environment for printing, among other features. The training empowered us to print remotely from a desktop. This was new and exciting! No more inking up machines, no more chemicals, no more plates. It was now all by the click of a mouse.

The training has made the transition from the old mechanized printery to digital a lot easier and has given the operators new confidence in mastering the process. Files are sent digitally across several platforms and the operators have total control over the output. The quality, set-up, print-on-demand and fewer chemicals all lend to a healthier environment in which to operate.

The training in Washington was further complemented by visits from Xerox specialists from the USA and BBML staff in Barbados.

Printery staff currently operate the Nuvera 288 (Xerox's fastest black and white digital printing system, 288 copies a minute), Docu Colour 5000 press, Xerox 242 Colour and 4112 BW Production Multifunction Copiers, Wide Format Printer, Perfect Binder, the Free Flow Make Ready Station and Remote operations.

Sandra Thompson, Dr Gordon Harewood and Susan Giles reviewing the first Pre-Slips to be printed by the Xerox printer

GREATER PRODUCTIVITY

The new digital equipment has transformed the *modus operandi* of the printery. Output and turnaround time for jobs have improved resulting in greater productivity.

This new initiative has made it possible to print a wide range of jobs in a shorter period of time. In fact, no sooner had the team returned from training at Xerox, than our skills were tested with the printing of pre-slips for the 2009 **CAPE** and **CSEC** May/June sitting. And we delivered.

The new printery has significantly changed the way **CXC** does it printing business. Since the printery was officially opened in 2009, we have moved leaps and bounds with our output, and amazingly with only two staff members. We now print all documents used by **CXC** for internal and external usage. These include calendars, booklets, manuals, multiple choice answer booklets, brochures and some stationery. As a result, outsourcing of documents has been at a minimum and is only done in cases when the printery cannot provide the service.

The approximately 700,000 answer booklets to be used for all **CXC** examinations in 2012 are now being printed for the first time in the history of **CXC** in the printery. An amazing feat, when one considers that the work being done in the printery was previously done by two major printers.

From Offset to Digital Printing

Xerox Nuvera 288 printing system

CLEANER TECHNOLOGY

As part of the transformation from the old to the new, a section of the printery space was specially configured for the new digital equipment. The physical environment in the printery is more welcoming. The printing environment is a lot healthier and cleaner as it relates to chemical usage and the effect it has on all staff. The automated processes are a tremendous help in this regard as well they reduce the amount of paper moving around the office as staff now send soft copies in PDF and the operators take it from there to produce the final documents.

CONVERGENCE

When **CXC** and BBML entered into an agreement to convert all of **CXC**'s printing requirements from offset and outsourced printing to in-house digital printing in a single production room, the pact also included the replacement of all single function printers. These were replaced with state-of-the-art multi-functional equipment, which can copy, print and scan.

The net benefit of this change was almost immediate in terms of cost as **CXC** no longer needed to purchase and store a variety of supplies and consumables. Another benefit was, having a single multiple-function machine in each department, the older single function machines were replaced and this provided greater control of usage and efficiency.

THE NUMBERS SPEAK

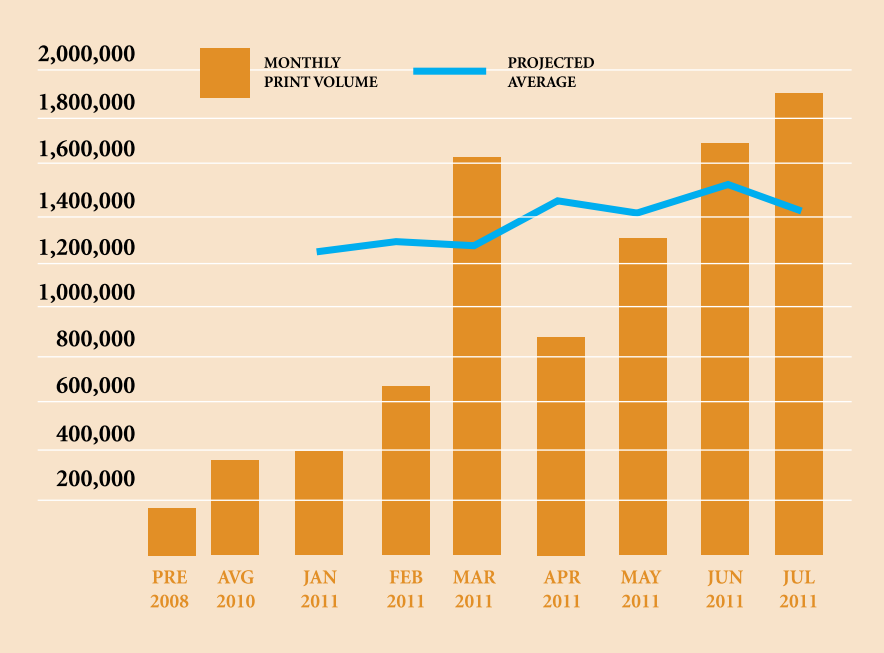
Since the advent of the digital printery, **CXC**'s print volume has grown from approximately 150,000 prints per month in 2008 to approximately 400,000 in 2010 to a staggering 1,800,000 per month in 2011. Over 90 per cent of all production printing is done in the printery with virtually no outsourcing.

Some of the documents now being printed in the printery are the 850,000 answer booklets, 700,000 MC's, time tables, Supervisor's Manuals, certificates and preslips.

It is expected that the Printery will produce in excess of 15,000,000 impressions in a year and this will result in significant net savings to the Council.

Digitalization has become the way of life at **CXC** and embracing the technology has made it possible to take us to another level.

Frankey Worrell, Noel Stephens and Charlie Vanderpool looking at piece of their handy work printed on the Nuvera 288



Connecting with STAKEHOLDERS IN CYBERSPACE

By Simone Pasmore

CXC goes Social! One might ask why an educational institution has chosen the social media as a major strategy to engage its stakeholders. **CXC** began its engagement in social media in early 2009, with the launch of a YouTube channel. However, **CXC**'s presence in the social media space was cemented in mid-2010 with the launch of the new website and the hiring of a full-time Webmaster. Our current social media outlets include: Facebook, Twitter, YouTube, U-Stream and Notesmaster.

So why have we gone social? We needed a new method to engage our candidates, our largest stakeholders across the region. We no longer live in a world where collaboration happens in one geographical location and more importantly, we cannot continue to lead our students in the world of the 1970s (**CXC**'s inception), when our world has now become so colourful and dynamic.

When we listen to our candidates in the various social spaces, we are able to answer their concerns almost immediately. Candidates are able to collaborate amongst themselves, with teachers and also with professionals. What's Cool about the social space, is that candidates are no longer limited to just their peers and teachers within their classroom or school, but rather across an entire region.

A common misconception about social media is that it is used to **"macco"** or **"faas inna people bizniz"** (you know the local terms for gossip, I am sure). What can social media do for you? Social media can be used for getting information on current promotions; latest industry trends, and yes the latest gossip too. In education, topics or articles are posted daily about the way learning can be enhanced in the classroom. Tips on how our students may better prepare for examinations and discussions are encouraged for everyone.

The social spaces have also proven to be extremely beneficial for **CXC**. We are gaining recognition in international spaces; we are able to feel and understand the concerns of students, gather statistical data; the list is numerous!

And so to our dear stakeholders, we thank you for joining us in the social space. We look forward to continued discussions on your valuable point of view.

And our latest addition! Check out our new learning resource, Notesmaster at **www.notesmaster.com**; get notes, view tutorials, post assignments, practice tests and quizzes… it's social learning for everyone!

CXC AND SOCIAL SPACES

Website www.cxc.org

This year we have added the e-commerce functionality to our website. One can now order transcripts online, order replacement certificates and even book advertising space on the website.

We also host **forum** space where we are able to host discussions, answer questions, and receive feedback on a regular basis from our various stakeholder groups.

CXC's **Blog** gives regular updates on the happenings here at **CXC**; you may follow the link directly from our home page.

Oh! You can view **presentations** of the various events and **conferences** we may host or be a part of.

FACEBOOK

Our Facebook page has indeed soared since we offered **online results** for the first time this year. We are now adding an average of 50 fans daily. Face book is where our largest stakeholder group is 'hanging out' and we are meeting them there. We certainly hope to see the continued thrust of collaboration with our various stakeholder groups as we seek to enhance education throughout the region.

U-STREAM

CXC hosted its very first webinar this year, just prior to the commencement of its May/June examinations. We were able to answer questions surrounding the examination policies, procedures, and answer several of the frequently asked questions which candidates and parents ask before, during and after exams. In addition, **CXC** streamed live our launch of the new **CCSLC** English and Mathematics texts in Barbados on June 20th and in Antigua on 22nd June, as well as the official release of the results for the May/June examinations sitting in Antigua on 16 August.

This medium allows **CXC**'s stakeholders worldwide to participate in all of its public events from wherever they are at the time without being in the host country. Stakeholders interact with the **CXC** officials at the event by asking questions on the streaming site and by giving their comments. And, if you missed any of the streaming events, you need not miss out; they can be viewed at your leisure on U-Stream. We hope to continue utilizing this new cost-effective medium to broadcast information and to host several more webinars.

Simone Pasmore is the Webmaster at **CXC**.

CXC® ICT OFFERINGS – CRITICAL FOR THE CARIBBEAN'S DEVELOPMENT

A FORMER PANEL MEMBER FOR CAPE AND CSEC INFORMATION TECHNOLOGY, NOW A SYLLABUS AND CURRICULUM DEVELOPMENT OFFICER WITH CXC, EXAMINES HOW THE CXC ICT OFFERINGS ARE HELPING TO EQUIP THE REGION'S POPULATION WITH THE KNOWLEDGE AND SKILLS REQUIRED FOR KNOWLEDGE-BASED ECONOMIES AND A TECHNOLOGY-DRIVEN WORLD.

By Gerard Philip

The Caribbean Examinations Council offers three subjects that incorporate the use of Information Technology. Information Technology is offered at the **CSEC** level and Information Technology and Computer Science are offered at the **CAPE** level. A fourth offering, Electronic Document Preparation and Management (EDPM) involves the use of Information Technology in the design, production and storage of electronic documents and is offered at the **CSEC** level. Syllabuses for each of these subjects include the knowledge, skills and attitudes required of students seeking to prepare for the world of work or for further academic pursuits.

Brunner (2001) argues that both the context in which schools operate and the purposes of education are undergoing drastic and rapid change through the action of technological forces beyond the control of the educational community. Brunnner recommends that schools be re-engineered to survive in the multi-channel technological world. Campbell and Nugent (2003) concur with Brunner and suggest that the Caribbean needs a working class that is highly skilled in Information and Communications Technology (ICT) in order to compete in the new arena shaped by globalization. Computerization and automation of private sector industries place great demand on educational policy makers and curriculum planners to accelerate the delivery of Information Technology into their education systems.

CSEC INFORMATION TECHNOLOGY

Information Technology has evolved over the past five decades in response to the need for more efficient techniques and systems to manage the significantly increased volume and sophistication of the knowledge reservoir of mankind. It merges the study of Computer Science, Telecommunications and Office Automation and involves the collection, storage, accessing, processing and dissemination of information and impacts on both work and leisure activities. The **CSEC** Information Technology (IT) syllabus, which assesses candidates at the General Proficiency level, represents an integrated approach to the delivery and assessment of Information Technology. Candidates are required to gain proficiency in problem-solving and program design as well as program implementation, using the programming language PASCAL. Topics in Information Processing and the Application and Implications of ICT usage are addressed. Candidates are also expected to gain mastery in the use of the Productivity Tools (Word Processing, Spreadsheets and Database Management).

CXC *ICT Offerings*

The programme of study in Information Technology develops computer-related skills and encourages the development of analytical, design and problem-solving skills which are applicable in all areas of the curriculum. This syllabus is designed to provide a coherent view of the significance of information in a socio-economic context. Emphasis is placed on application of knowledge and the use of the computer. This approach has been adopted in recognition of the impact that changes in the availability of information can have on the educational process. The focus is on getting students to develop skills for life in an increasingly technological world, rather than on students absorbing a myriad of seemingly unrelated facts which may have only short term relevance.

The syllabus provides the teaching and learning environment for students to learn with tools that will shape their future. Students must have access to computers, printers and related hardware devices, as well as to productivity tools software and a computer programming application. Access to the Internet in a networked environment is also preferred. Desired ethical attributes and Internet protocols such as e-mail etiquette, what is appropriate to post on social-networking sites and the respect for intellectual property are inculcated. Students are empowered to transfer the Information Technology skills to other areas of endeavour including academic pursuits, entertainment and leisure activities.

In a world characterised by technological innovation and computerized responses to situations in the workplace and in the wider society, it is imperative that all citizens possess a working knowledge and be afforded practical exposure to Information Technology in order to cope with its pervasive use in virtually all spheres of society. The delivery of Information Technology is essential in providing citizens of the Caribbean region with the best chances for survival and growth in this new age.

CAPE INFORMATION TECHNOLOGY

The **CAPE** Information Technology Syllabus reflects the belief that an in-depth knowledge of Information Technology is essential to sustainable economic and social development of the region. The widespread use of Information Technology, the tools and techniques for inputting, processing, storing, outputting, receiving and transmitting information, made possible because of improvements in computer and telecommunications technology, has significantly contributed to the evolution of the information society in a knowledge-based economy. A large proportion of business transactions are now performed using computer-based technologies utilizing local, metropolitan and wide area computer networks. The Internet and multimedia computers have had significant impact on the ways in which people work, learn, communicate, conduct business, and seek entertainment. The increased integration of computer and telecommunications technology has led to an increased globalisation of the world economy.

In order for the Caribbean to participate in, and contribute to this new world, it is essential that Caribbean people become familiar with this technology. This not only implies that students must know how to use the technology from a purely technical point of view, but it also means that they must be conscious of the positive and negative impact of Information Technology. In particular, students must be made aware that the appropriate use of Information Technology can help solve the problems in the workplace as well as problems they might encounter in their daily lives, using the tools and techniques of the computer and computer-related technologies.

The delivery of **CAPE** Information Technology also empowers students to develop an awareness of the ethical, legal and political considerations associated with Information Technology, and encourages them to use information sources to retrieve, interpret and communicate information effectively while adopting a positive attitude to change, and to new and emerging technologies. The syllabus also seeks to develop students' critical thinking and problem-solving skills. Students are required to critically evaluate the relevance, reliability and completeness of information and make critical analyses of proposed solutions and to arrive at informed decisions. Students are also required to determine solutions to problems using appropriate software applications.

The study of **CAPE** Information Technology articulates with several undergraduate degree programs in Information Technology and related fields offered by universities and other tertiary institutes in the region as well as internationally.

CAPE COMPUTER SCIENCE

The world continues to experience unprecedented advancements in computer and telecommunications technology. Dramatic improvements in computer and telecommunications technology has significantly changed society by revolutionising the way information is gathered, manipulated, analysed and disseminated. The application of Computer Science is the virtual engine that fuels digital technologies. Multimedia computers, the Internet with its attendant protocols, and the increased use of mobile networks are all propelled by advancements in Computer Science, which has had significant impact on knowledge acquisition, personal and business communication, commerce, academic research as well as entertainment.

The increasing importance of computer-based applications provides an important economic opportunity for the region. In recognition of this, a number of regional governments have made the provision of information services, including computer programming and software engineering an important element in their economic development. In order for the Caribbean to become an integral part of this new world and to take advantage of the economic opportunities it offers, citizens need not only to be able to use existing computer-based systems but also to create and maintain them. Students need to acquire advanced knowledge, skills and attitudes to enable them to understand the uses and impact of computer technologies, and to use the technology to create new computer applications for all areas of human activity.

The **CAPE** Computer Science syllabus places emphasis on Computer Architecture, Programming, Data Structures, Software Engineering, Operating Systems and Networking. The course is intended primarily for students who want to pursue a professional career in Computer Science or related disciplines and provides the opportunity for the acquisition of relevant knowledge, skills and attitudes for further studies in Computer Studies and the world of work.

While many adults may be technologically challenged, today's youth are technologically savvy and interact with computer-based technologies on a daily basis. It has indeed become part of their culture. Inevitably, the education systems of the Caribbean must foster the development of individuals who would accept the challenge of designing and developing computer software and systems that meet and exceed regional and international standards. Students must be afforded the opportunity to acquire the knowledge and skills needed to create, use and maintain computer-based systems in order for the Caribbean region to take its place as an integral, contributing part of the knowledge-based economy in a technology-driven world.

Gerard Phillip is an Assistant Registrar - Syllabus and Curriculum Development based at **CXC***'s Western Zone Office in Jamaica. He is a former Panel Member for* **CSEC** *and* **CAPE** *IT syllabuses.*

GROWTH OF CSEC® IT

"If the Caribbean is to become globally competitive, all secondary school students should be doing Information Technology"

Professor E Nigel Harris, Chairman of **CXC** *and Vice Chancellor of The University of The West Indies.*

In response to the burgeoning need for the certification of individuals who possess the knowledge and skills for jobs requiring skills and competencies in Information Technology (IT), as well as to certify applicants desirous of entering the expanding field of Computer Science and Information Technology in tertiary institutions, the **CXC** introduced Information Technology at the **CSEC** level in 1990. The introduction of IT as a subject offered by **CXC** was done notwithstanding the very limited computer hardware and software resources available to students in secondary schools throughout the region. A conscious decision was made by **CXC** to take the lead by offering the certification. It was left to policy makers and educational planners in the various territories to take the necessary steps towards the supply of computers, printers and relevant software to schools.

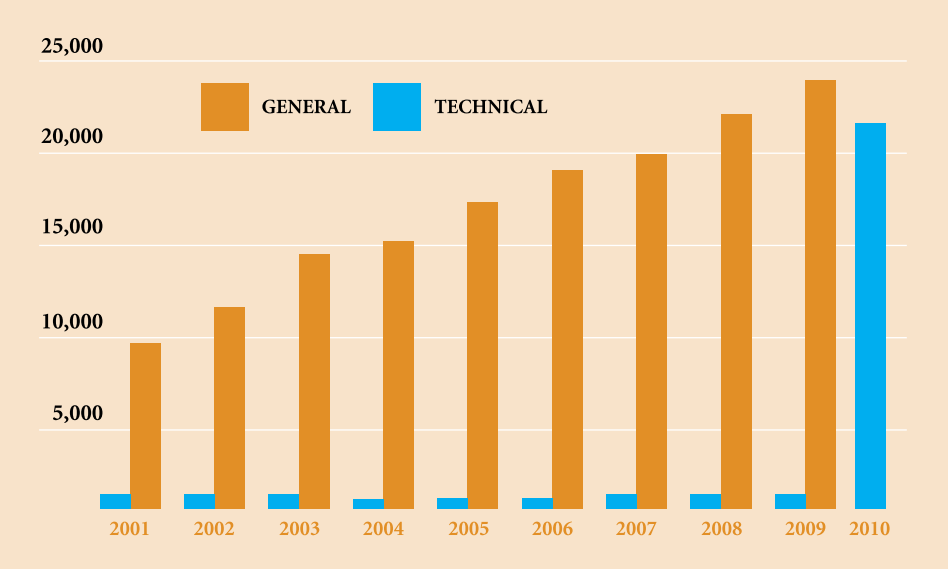
Information Technology was offered at two proficiencies, General and Technical. The General Proficiency was designed for candidates who were interested primarily in a foundation for post- secondary studies in Computer Science and catered to the development of knowledge and skills essential for computer specialists. Candidates were required to gain proficiency in problem-solving, algorithm development and computer programming. Candidates were allowed to write computer programs using any suitable programming language. The number of students attempting the General Proficiency, however, was usually very small in comparison to the number who attempted the Technical Proficiency. The ratio of General Proficiency to Technical Proficiency candidates over the period 2002 – 2008 was 1:25. Students attempting IT General Proficiency were not required to do Paper 02, the practical examination. The practical examination tested candidates' ability to solve problems using the productivity tools – Word Processing, Spreadsheets and Database Management.

The Technical Proficiency was designed for students who wished to develop entry-level skills for employment as well as for further education. Emphasis was placed on mastery in the use of various productivity tools. The syllabus was unique, allowing for the pursuit of either Proficiency. Sections 8 and 9, Information Processing and Programming, were done only by students attempting the General Proficiency, while students attempting Technical Proficiency were asked to complete objectives in Sections 5, 6 and 7 (Productivity Tools). Sections 1 – 4 which contained objectives on computer theory, and application as well as problem-solving using algorithms, were done by all candidates.

The difference in focus resulted in a difference in demand for access to limited computer resources to implement the programmes. The Technical Proficiency required approximately 95 laboratory hours over the two years. The General Proficiency required considerably less. Both General and Technical Proficiencies were equated in terms of level of attainment, and the difference was one of kind rather than degree of knowledge or competence.

The number of candidates attempting IT increased considerably since 1990. In that year, less than 1000 candidates registered for the examination. At the May/June 2010 the number of candidates attempting the examination was 21, 542 (see Graph 1). The increase was skewed towards candidates attempting the Technical Proficiency. This prompted the Council to undertake research to investigate the reasons for candidates' Proficiency preference and the utility of continuing to offer both General and Technical Proficiencies.

In 2008, following extensive research and consultations with teachers, the business community, tertiary institutions and other stakeholders, the Council proceeded to revise the **CSEC** IT syllabus. The syllabus, which assessed candidates at both Technical and General Proficiencies, was discontinued and a new syllabus was developed, designed to assess candidates at the General Proficiency only. The syllabus focused on the essential knowledge, skills and attitudes candidates should acquire in IT. The syllabus therefore included all the essential knowledge, skills and attitudes required for work and for further education. The new syllabus represented a new approach to the delivery and assessment of Information Technology. Several objectives and accompanying content were revised. Additionally, several objectives and content in Problem-solving and Programming, deemed to be too challenging for candidates at the **CSEC** level, were removed. The Practical Paper was removed and the requirements of the School-Based Assessment were extended to assess candidates' mastery of the Productivity Tools. The weighting of the School-Based Assessment was also increased to compensate for the removal of the Practical Paper. The revised syllabus was effective for examinations from May/June 2010.



Graph1: Candidates Attempting General and Technical Proficiency 2001 – 2010

The Differences between Information Technology and Computer Science

By Audrey McKenzie

To the man in the street, Computer Science and Information Technology mean more or less the same thing. However, students pursuing these subjects know that, speaking in strict computing jargon, there are differences between the two.

The rapid pace of technological advancements is transforming organisations, societies and individuals in what and how they do things. The impact is also seen in the Computing curricula offered by educational institutions.

THE DISCIPLINES OF COMPUTING

In its Computing Curriculum 2005 (CC2005): the Overview Report, the Association of Computer Machinery (ACM) and IEEE Computer Society recognise five major disciplines of Computing. The disciplines are as follow:

- **Computer Engineering (CE)**, which focuses on the design and construction of computers and computer-based systems, that is, the study of hardware, software, communications, and the interaction among them. It covers the theories, principles and practices of traditional electrical engineering and mathematics, and applies them to designing computers and computer-based devices.
- **Computer Science (CS)**, which concentrates on designing and implementing software, devising new ways to use computers and developing effective ways to solve computing problems. Computer Science covers a wide range, from the "theoretical and algorithmic foundations to cutting-edge developments in robotics, computer vision, intelligent systems, bio-informatics and other exciting areas."
- **Information Systems (IS)**, which highlight the integration of information technology solutions and business processes to meet the information needs of organisations, enabling them to achieve their strategic objectives in an effective, efficient way. Its emphasis, however, is on the information.
- **Information Technology (IT)** complements information systems, as its emphasis is on the technology used to convey the information. It combines theories and practices to support both an organisation's information technology infrastructure and the people who use it.'
- **Software Engineering (SE)**, which concentrates on building and maintaining software that are reliable and efficient and satisfy all user requirements. It integrates the principles of mathematics and CS with the engineering practices.

Many schools and universities have combined modules from two or more disciplines to create their own unique curricula to meet the needs of their particular culture and region and, as new technologies emerge.

HISTORICAL BACKGROUND

Computer Science was introduced to the Caribbean region in tertiary institutions such as the University of the West Indies in the 1970s. With the pervasiveness of computers, not only in businesses and academia, but also in homes, there was also a dramatic expansion and explosion of disciplines in the computing field in the 1990s. Many tertiary institutions are now offering new computer-related courses.

At the secondary institutions in the Caribbean region, students at the **CSEC** level were first introduced to Information Technology, which spans the five Computing disciplines. Computer Science and Information Technology were then offered at the **CAPE** level in recognition of the differences between both disciplines.

THE CURRICULA

In the CC2005 Overview Report, a graphical characterisation was used to illustrate the commonalities and differences among the computing disciplines. **(SEE FIGURE 1)**

On the horizontal axis, the range runs from Theory, Principles and Innovation on the left to Application, Deployment and Configuration on the right. A student who prefers to invent new things or develop new principles would occupy the space on the left. The student who wishes to assist organisations in choosing and applying appropriate technologies to solve problems would occupy space on the right.

On the vertical axis, the range runs from Computer hardware and Architecture at the bottom to Organisational Issues and Information Systems at the top. The focus at the top is on the people, information and organisational workspace, whereas, the focus at the bottom is on the computer devices and the data shared among them.

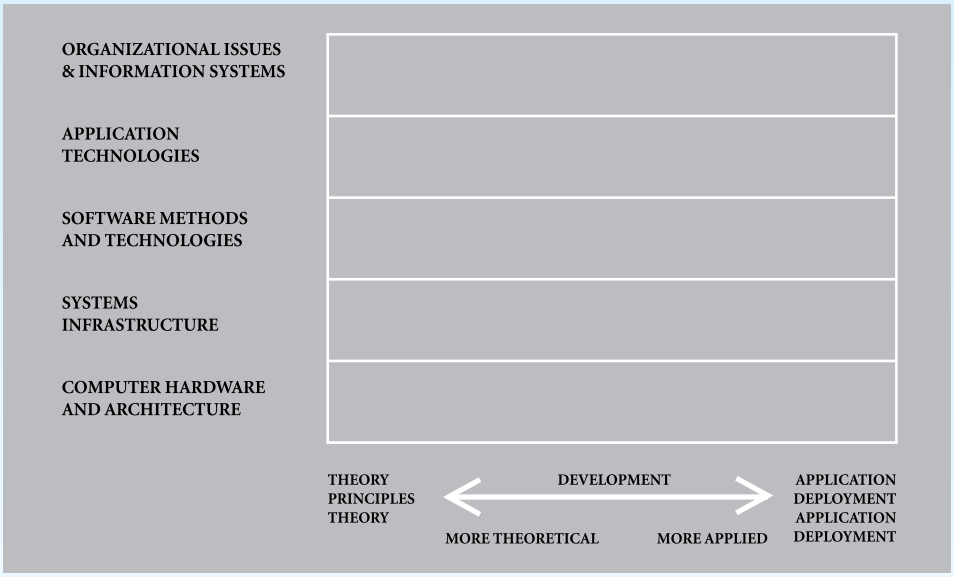


FIGURE 1: Problem Space of Computing *Extracted from CC2005: The Overview Report*

The shaded area in **FIGURE 2** represents the Computer Science discipline. On the vertical axis, it is evident that Computer Science covers the gamut of software design and development, from operating systems to applications. Along the horizontal axis, the shaded area ends just about the ¾ mark, indicating that Computer Science has virtually nothing to do with application deployment and configuration, which looks at selecting the most appropriate computer products, customising computer products to meet organisational needs, and learning to use such products.

Computer Science courses emphasise the mathematical and theoretical foundations of computing. The core areas of study should include the following:

- *Computer Architecture and Organisation*
- *Algorithms*
- *Programming*
- *Programming Languages*
- *Human-Computer Interaction*
- *Data Structures*
- *Database Management*
- *Software Engineering*
- *Intelligent Systems*
- *Operating Systems*
- *Computer Networks*

The shaded section in **FIGURE 3** represents the Information Technology discipline. It reveals that the focus is more on application deployment and configuration, and from the perspective of systems infrastructure to organisation issues and information systems. Understanding the theories and principles of computer hardware and architecture is not necessary. However, most IT courses provide a foundation in computing theories and concepts.

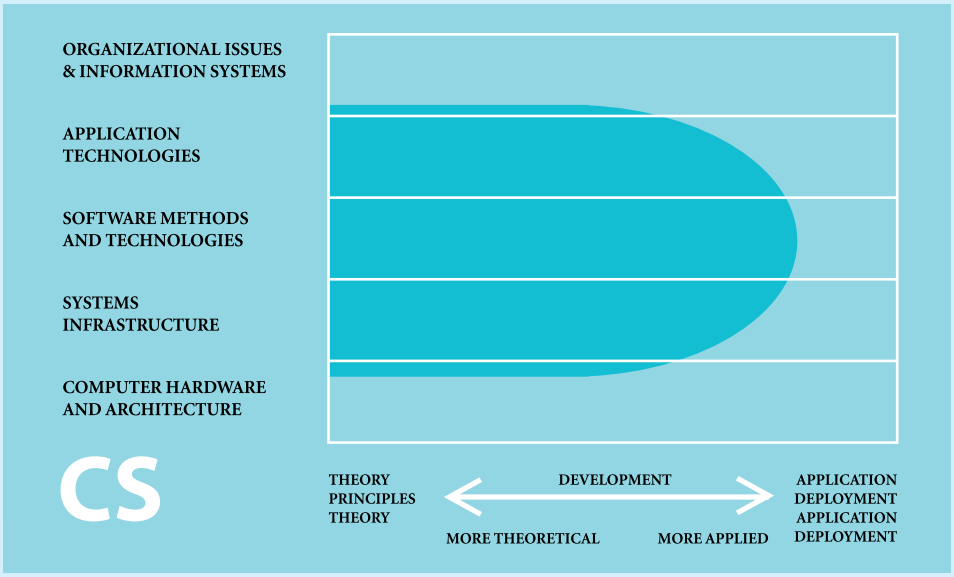


FIGURE 2: Snapshot of Computer Science *Extracted from CC2005: The Overview Report*

Information Technology courses cover how computers are used to efficiently process, store, share and manage data, as well as, to present and disseminate information. Typically, the core areas of study include the following:

- *Fundamentals of Information Technology*
- *Algorithms*
- *Programming Fundamentals*
- *Human-Computer Interaction*
- *Information Systems*
- *Information Management*
- *Networking and Communications*
- *System Integration and Architecture*
- *Web Systems and Technologies*
- *Social, Organisational and Other Issues*

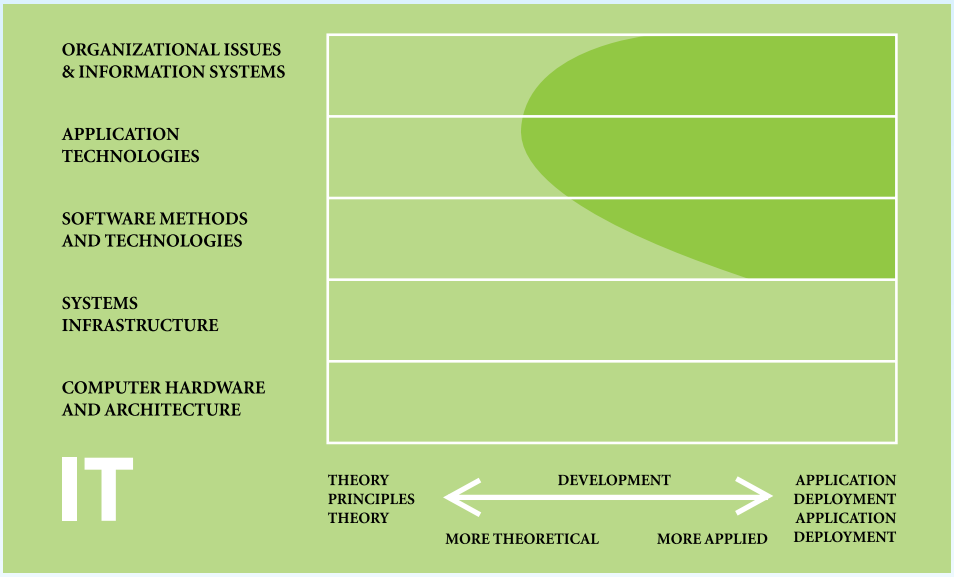


FIGURE 3: Snapshot of Information Technology *Extracted from CC2005: The Overview Report*

In keeping with the differences between the two disciplines, **CXC** offers Computer Science and Information Technology at the **CAPE** level. Table 1 provides a comparative view, in some detail, of the core areas covered in the **CAPE** syllabi for Information Technology and Computer Science.

CAREERS

The differences between these two disciplines dictate the careers that students/graduates are equipped to pursue. The career paths for a Computer Science graduate are;

- *Software developers, Programmer analysts, computer programmers, systems analysts, etc - designing and implementing software*
- *Research and development - devising new ways to use computers, and developing effective ways to solve computing problems.*

Some of the careers opened to graduates of Information Technology are;

- *System Administrators*
- *Network Administrators*
- *Database Administrators*
- *Telecommunications Specialists*
- *Network Engineers*
- *Web Designers*

CONCLUSION

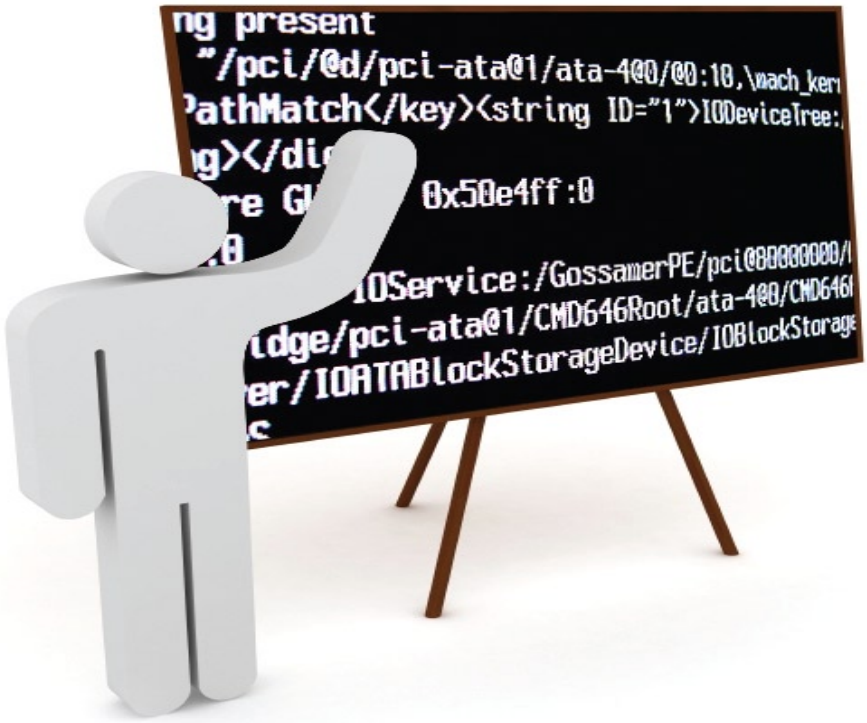
In a nutshell, regarding the differences, someone said that Computer Science is a basic science and Information Technology is an applied science.

CORE AREA	CONTENT COVERAGE	CS	IT
Algorithms	Stages of problem solving	✓	✓
	Control structures	✓	✓
	Ways to represent algorithmic solutions	✓	✓
	Implement solutions by developing programs	✓	
	Implement solutions using IT tools		✓
Computer Architecture and Organisation	Hardware components of a computer system	✓	✓
	Design of hardware devices	✓	
	Functions of hardware devices	✓	✓
	Characteristics of the processor	✓	
Data Structure	Abstract data types	✓	
	Searching and sorting techniques	✓	
Human-Computer Interactions (HCIs)	Types and distinguishing features of HCIs	✓	✓
	Design and implement a HCI	✓	
Information Management	Characteristics and representation of data	✓	✓
	Characteristics and representation of information		✓
	Configure and manage DBMS		✓
	Data integrity and security		✓
Information Systems	Stages of software development process	✓	✓
	Types of information systems	✓	✓
	Implement information systems	✓	✓
	Train and manage information systems		✓
Networking & Communications	Types of networks	✓	✓
	Design of communication devices	✓	
	Network architecture and topologies	✓	✓
	Install and manage networks		✓
Operating Systems	Functions of operating systems	✓	
	Resources management	✓	
Programming Fundamentals	Stages of program development	✓	✓
	Programming Paradigms and languages	✓	✓
Programming	Programming techniques	✓	
	Stages of the translation process	✓	
	Write, test and debug programs	✓	
Software Engineering	Stages of software development life cycle	✓	✓
	Life cycle models	✓	
	Tools, techniques and deliverables	✓	✓
	Coding process	✓	
Social, Organisational and Other Issues	Ways in which IT impacts Society, organisations and individuals		✓
	Threats using IT systems		✓
	Threats against IT systems		✓
	Mitigation strategies (mechanism and measures)		✓
Web Systems and Technologies	Design and manage web systems		✓
	Internet tools		✓

*Audrey McKenzie is the Former Chief Examiner, **CAPE** Information Technology, Ex Officio, **CAPE** IT and Computer Science Subject Panels, and is the Director, ICT Management, Ministry of Finance, Jamaica*

REFERENCES

1. *Computing Curriculum 2005 (CC2005): the Overview Report; Association of Computer Machinery (ACM) and IEEE Computer Society*
2. *Information Technology 2008 Curriculum; Association of Computer Machinery (ACM) and IEEE Computer Society*
3. *Computer Science 2008 Curriculum; Association of Computer Machinery (ACM) and IEEE Computer Society*
4. **CAPE** *Information Technology Syllabus 2008;* **CXC**
5. **CAPE** *Computer Science Syllabus 2008;* **CXC**



A PLACE FOR PROGRAMMING

By Glenda Gay

Since **CXC**'s addition of the Information Technology (IT) as a **CSEC** subject in 1993, candidate registrations have increased to over 28,000 at the Technical Proficiency level by 2009 compared to around 1,106 at the General Proficiency level. The syllabus comprised theory and practical components with an emphasis on Programming. Unfortunately, successive **CXC** IT subject reports from 2004 to 2009 stated that most candidates were not attempting any Programming questions and consistently noted that Programming "…continues to be an area of weakness. Candidates' responses in this section indicate that they were not well-prepared to handle the questions…" (http://www.**cxc**.org/students-and-parents/exam-results-reports). In 2004, a disappointing overall acceptable grade rate of 51 per cent was attributed to a "consistent number of candidates who did not attempt any Programming question", and teachers attending IT workshops from across the region expressed the desire to have this component removed from the examination (**CXC**, 2004). In 2009, an updated syllabus (IT Syllabus **CXC** 30/G/SYLL 08) merged much of the content of the Technical and General Proficiencies resulting in a single proficiency subject. **TABLE 1** provides the information on the subject and programming focus extracted from the pre-2010 syllabus and the current one.

FAILURE RATES IN PROGRAMMING

In 2000, a UNESCO report written by Daley-Morris (2000a), documented a scarcity of research on Caribbean high-school students' performance in introductory programming. Daley-Morris noted the start of a decline in performance in programming, surmised that there were deficiencies in the regional education system causing teachers to avoid teaching programming topics, and implied that teachers may not perceive programming as a priority. Milne and Rowe (2002), also noted that hardly any studies were being conducted on the teaching of introductory programming courses. Early research acknowledged that traditional methods of teaching programming were seemingly frustrating students rather than encouraging them to further develop their programming skills (Forte, 2003). Although policy papers and documents have been produced, there has been insufficient research in the Caribbean region on factors that contribute to these poor results in programming. Indeed some teachers are hired based on a degree, others use short-term training in IT as eligibility for teaching the subject, but some countries have no academic requirements for IT (EFA, 2000; Guyana, 2003; Trinidad, 2004).

IT teachers attending IT-specific workshops across the Caribbean within the last five years expressed the desire to remove the programming component from the syllabus. This sentiment

was similar to that expressed by Dagdilelis, Satratzemi, and Evangelidis (2004), who recorded teachers' perception that IT involves no programming and therefore should not be part of the syllabus. Foster (2005), agrees stating that, "Information technology is the right home for an awful lot of students who … do not really have the interest in becoming programmers" (p. 3). In contrast, others note that programming has become a fundamental component of IT and is therefore an accepted requirement of any IT syllabus especially at business schools. What is more important, however, is that the *skill set, weight and delivery of programming in IT* are fundamentally different from the corresponding programming component in computer science or software engineering (Bills and Biles, 2005; Ekstrom, et al., 2006).

Studies show that students' self-perception of programming performance, time allotted to teach the subject, and teacher certification have been reported as having an impact on their performance in the topic (Bergin & Reilly, 2005; Byrne & Lyons, 2001; Crossfield, Daugherty, & Merril, Fall 2004; Goldhaber & Brewer, 2000; Pillay & Jugoo, 2005). Given that candidates have exhibited a trend in poor performance on the programming component of the IT exam, this article focuses on whether teachers' interest in programming, academic qualifications and time to complete the syllabus have an effect on student performance. It is important to conduct research on factors that cause failure rates in exit exams since poor results are of concern to policy makers, administrators and educators (Downes, 2006; Green-Evans, 2003).

INTEREST IN TEACHING PROGRAMMING

Teachers' perception of their candidates' achievement tend not to be significantly different than actual achievement levels (Parris, 2000). If problem solving is an area of weakness, then according to Daley-Morris (2000b) in her study on Jamaican students' performance in the IT exams, encouraging students to practice solving problems will be important in helping them to perform better in programming. Many teachers unfortunately assume that candidates can only learn programming by writing programs (Lister & Leaney, 2003). This usually produces frustration among students who become "overwhelmed, uncertain of how to begin, and grasping at the air … [leading] … to the self-destructive tendency to do experimental programming, where they just randomly throw things in to see if it helps" (Buck & Stucki, 2001, p. 17). This can have a negative effect on students' appreciation of programming. Jenkins (2001), suggests that the traditional approach to teaching programming is no longer effective because the students are not motivated and recommends that the onus be placed on teachers to address students' motivation by finding interesting ways to present their topic. A comparison of students who have effective and ineffective teachers for three consecutive years, resulted in a marked decrease in performance with students who had the least effective teacher (Anthony & Kritsonis, 2006). However, Crossfield, Daugherty, & Merril (Fall 2004), reported that teachers were apparently unaware of how poorly their students performed in specific components of their subjects.

TEACHERS' ACADEMIC QUALIFICATION

Many teachers enter the profession through various methods, including completion of traditional university-based degree programmes, teaching certification, and temporary teaching positions (Boyd, Grossman, Lankford, Loeb, Wyckoff, 2005). Even with academic qualifications, there are different views on what constitutes a highly qualified teacher. The No Child Left Behind Act (NCLB), defines a highly qualified teacher as having a bachelor's degree, full state certification or licensure and proof of knowledge of each subject they teach.("No Child Left Behind,"). Goldhaber & Brewer (2000) add that they must have a thorough understanding

	PRE-2010 – SYLLABUS CXC 30/G; T/SL 00		2010 CXC – 30/G/SYLL 08
	TECHNICAL	GENERAL	GENERAL
Focus of subject as described in syllabus	-Technical/vocational -Employment	- College - University	None described
Registrations	28,867	1,106	24,355
Programming Units	(a) Intro to Programming	(a) Intro to Programming (b) Programming	(a) Problem solving and program design (b) Program implementation
Suggested timetable allocation for programming	(a) 5 hours	(a) 5 hours (b) 15 hours	(c) 7 hours (d) 15 hours
Programming component in Examination	Paper 1: Section III Answer all four questions	Paper 2: Section II Attempt three of four questions testing both (a) and (b)	Paper 1: 15 multiple choice questions Paper 2: Section III Must answer all four questions
Marks allocated to programming component in Exam	30 marks of 90-mark paper	75 marks of 150-mark paper	Paper 1: 15 marks Paper 2: 45 marks of 120-mark paper
Programming component in SBA	None	Programming Project	Programming component added to WP, SS, and DB
Marks allocated to programming in SBA	None	25 of possible 60 marks	30 of possible 90 marks
Percentage weighting profiles (Total)	10per cent	33 1/3per cent	33 1/3 per cent

TABLE 1. Information extracted from IT Syllabus CXC 30/G; T/SL 00 and IT syllabus CXC 30/G/SYLL 08

"RESEARCH ON FAILURE RATES IN PROGRAMMING WILL ALSO IMPACT ON FUTURE UNIVERSITY ENROLLMENT IN COMPUTER SCIENCE, AND INFORMATION TECHNOLOGY WHERE PROGRAMMING IS AN INTEGRAL PART OF THE CURRICULUM."

of the different ways students learn and how best to teach them, along with maintaining a career-long professional development so as to respond effectively to changing demands in the classroom. Miller (2006), has a less clinical definition in stating that a good and well trained teacher is one who "has a sound grasp of the major ideas and principles, a sound working knowledge of the content of the subjects that they teach" (p. 2).

Despite these definitions, finding a highly qualified or good, well trained teacher of IT is difficult. An assessment by Lunt, Ekstrom, Gorka, Kamali, Lawson, Miller, & Reichgelt (2005), showed that although IT programmes exist in colleges of computing, Computer Science departments, schools of technology, and business schools, IT teachers possess "degrees in information systems, electronics, communications, graphics arts, economics, mathematics, computer science, and other disciplines" (p. 2). They conclude that few to none of these IT teachers have a degree in IT. Over 10 years ago, Daley-Morris (2000b) noted that Jamaica had difficulty in attracting trained teachers, possibly accounting for teachers' inability to teach programming due to lack of knowledge on the topic. Daley-Morris recommendations nonetheless, stated that, "a rigid set of regulations for teaching IT be developed and enforced" (p. 20). As teachers become more knowledgeable in their fields, they also become more skilful at teaching it to others (Miller, 2006).

COMPLETING THE SYLLABUS

Parkes & Harris (2002), define a syllabus as a contract between the teacher and student which provides details of how the student will be assessed, how long it should take to be completed, and therefore serves as a permanent record of what was taught is the subject. Teachers who are aware of their students' reluctance to learn this component, may use this knowledge to eventually exclude this component from the syllabus. If a teacher spends more time on other topics, or the students do not respond positively when a topic is introduced, then it may be preempted for a more interesting one, until it is eventually omitted. McCauley (2004), believes that every programming teacher has an idea of why students struggle with programming and theorizes that many teachers model their classes after those who taught them. As they are asked to teach topics that they were never taught themselves, those topics are eventually omitted from their teaching.

Irrespective of the reasons for not completing the syllabus, students' inadequate exposure to the programming component has implications for their overall performance as reported in the exam results. Over ten years ago, Daley-Morris (2000b), challenged that poor results in **CXC** IT exams were attributed in part to the programming component and suspected that a closer look at students with passes in IT would reveal that that "they either failed the programming component or received a very low passing grade" (p. 20). In addition, Crossfield, Daugherty, & Merril (Fall 2004) published research on factors affecting Jamaican students' performance in another **CXC** subject component. These authors both concluded that students' lack of exposure to the required component in the syllabus could have been a contributing factor to their poor performance. They also reported that inadequate time to complete the syllabus was the cause for teachers' inability to prepare students for success in exit exams, and that some aspects of the curriculum were being omitted because of lack of staff expertise. If teachers believe that their students are capable of doing their best, then they may feel compelled to give their students the best chance possible in the exit exam, by completing the syllabus (Anthony & Kritsonis, 2006).

Parkes & Harris (2002) reiterate that teachers' philosophies about teaching, learning, and the content area 'shape the course and consequently the syllabus both implicitly and explicitly' (p. 55). Therefore, teachers who are somehow unable to apply the appropriate teaching tools and detect learning gaps in their students are ill-prepared to cope with technology specific curriculum content, changes in text books, or even changing methods of testing (Miller, May 2006). The writer also appropriately summarizes that, "A syllabus in the hands of a good teacher could accomplish much more than the best curriculum in the hands of a poor teacher" (p.2).

SURVEY METHODOLOGY

So how is the state of programming in this subject within recent years? This article will share the results of data collected from IT teachers surveyed from 2006 to 2010. They were asked to complete an anonymous questionnaire that focused on their teaching of the programming topics. Data was captured using anonymous questionnaires from teachers in Antigua and Barbuda, Barbados, Guyana, Jamaica, Tobago, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago. The survey collected data on teachers' academic qualifications, number of IT classes they teach, other **CXC** subjects they teach, whether they like to teach programming and whether they had taught the programming part of the syllabus prior to their students taking the exam. Three hundred and eighty-two completed surveys were returned, with 349 teachers indicating that they taught students for the Technical Proficiency exam and 33 for General Proficiency. Data based on the Technical Proficiency was used since **CXC** reports on poor performance were based on this proficiency. This article therefore attempted to initially identify those programming areas that teachers' believed existed with their students.

Since the survey focused on the programming component, teachers were asked whether they perceived that their students had problems with the various programming topics described in the syllabus under specific objectives. Pearson Chi-Square analyses were conducted to examine whether there was a relationship between teachers' perception that their students had problems in each of the programming specific objectives in the syllabus and four other factors, namely; teachers' completion of the syllabus, gender, academic qualifications, and liking towards teaching programming. A section also comprised items designed to elicit responses from teachers regarding their experiences with problems that their students would have experienced in the programming component prior to the merged 2010 syllabus. The items used the topics from the programming section of the syllabus to ask teachers whether their students had problems in seven programming areas, with Likert-type responses on a five-point scale.

a Place for Programming

RESULTS

TABLE 2 shows the demographics of teachers who taught students at IT Technical Proficiency. Apart from teaching similar subjects such as mathematics and science, the results revealed that IT teachers also taught Agriculture, Spanish, Technical Drawing, English, Geography, EDPM, Office Administration, and other business studies courses. **TABLE 3** presents the significant results of relationships between the pairs of factors and topics. There were no significant differences among the factors and topics for SO7.

TABLE 4 indicates that there was a relationship found between teachers' academic qualifications and topic SO5, constructing and using a trace table. Academic qualifications were categorized as having a university degree, teaching certification, or non-university qualifications such as short-term IT training. The results showed that about half of the teachers (50.7per cent) with only teacher certification strongly believed that their students had problems with constructing and using a trace table to test algorithms and programs (SO5). In contrast, about a third (33.9 per cent) of the teachers with university degrees and 10.5 per cent who possessed short-term IT training believed their students had problems with this topic (Chi-Square value = 17.20, df 4, p = .002).

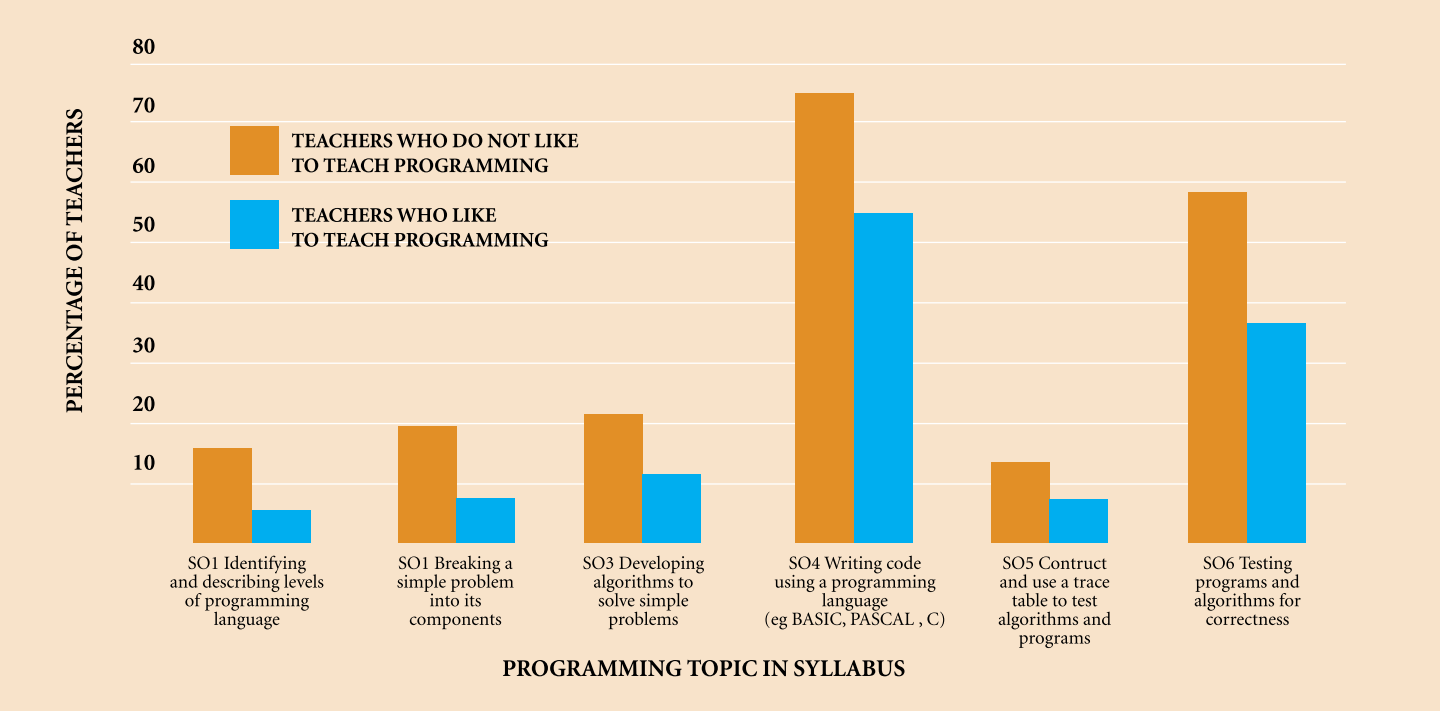
Teachers were asked to respond 'Yes' or 'No', to whether they liked to teach programming generally. The results in **TABLE 4** showed significant differences in all but one programming topic. In six of the seven topics, there were higher percentages - almost a 2:1 ratio in some cases – of teachers who did not like to teach programming having the perception that their students had problems with the programming topics. Teachers who like to teach programming appear to have a significant positive relationship on their students regarding the topics. Figure 1 (or Table 4) shows the comparisons between teachers who like or do not like to teach programming, and the specific objectives for programming. Teachers were also asked to indicate 'Yes' or 'No' if they had completed the programming topics of the syllabus. The results in table 4 showed that 24.4 per cent of the teachers who did not complete their teaching compared to 9.1 per cent who did complete their teaching believed that their students had problems with the topic that tested programs and algorithms for correctness (SO6).

	Number (per cent)	
Number of teachers	349	
Gender:		
Males	139 (39.8 per cent)	
Females	210 (60.2 per cent)	
Age Range		
Under 30	135	(43.9)
31 – 49	196	(51.5)
50 – 65	14	(4.0)
Not stated	4	(1.1)
Academic Qualifications		
University Degree	201 (57.6)	
Teaching Cert only	69	(19.8)
Short Course in IT	49	(13.2)
Not stated	33	(9.5)
Students per class		
1 to 10	5	(1.4)
11 to 20	93	(26.6)
21 to 30	127	(36.4)
31 to 40	83	(23.8)
41 to 50	27	(7.7)
Over 50 students	5	(1.4)
Not stated	9	(2.6)
Programming background	N=296	
Male	115	(38.9)
Female	181	(61.1)
Like to teach programming	N=208	
Male	97	(46.6)
Female	111	(53.4)

		TEACHERS' ACADEMIC QUALIFICATIONS	TEACHER LIKES TO TEACH PROGRAMMING	TEACHER COMPLETING SYLLABUS
SO1	Identifying and describing levels of programming languages		✓	
SO2	Breaking a simple problem into its components		✓	
SO3	Developing algorithms to solve simple problems		✓	
SO4	Writing code using a programming language (e.g. BASIC, Pascal, C)		✓	
SO5	Construct and use a trace table to test algorithms and programs	✓	✓	
SO6	Testing programs and algorithms for correctness		✓	✓
SO7	Explaining terms associated with running a program			

TABLE 3. Significant results of relationships between the pairs of factors and programming topics

Figure 1. Comparisons between teachers who like or do not like to teach programming, and the specific objectives for programming



OR

TABLE 4. Comparisons between teachers who like or do not like to teach programming, and the specific objectives for programming

Topic		Teachers who do not like to teach programming	Teachers who like to teach programming	
SO1	Identifying and describing levels of programming languages	16.0	7.0	(Chi sq value=9.73, df 4, p= .05)
SO2	Breaking a simple problem into its components	20.2	8.3	(Chi sq value=12.26, df 4, p= .02)
SO3	Developing algorithms to solve simple problems	21.7	12.9	(chi sq = 9.94, df 4, p= .04)
SO4	Writing code using a programming language (e.g. BASIC, Pascal, C)	75.6	54.5	(chi sq = 20.91, df 4, p= .001) *
SO5	Construct and use a trace table to test algorithms and programs	14.1	7.2	(Chi sq value=10.21, df 4, p= .04)
SO6	Testing programs and algorithms for correctness	59.1	38.8	(chi sq = 19.58, df 4, p= .001)

DISCUSSION

Teacher certification may be a welcome support to any subject, but may not be effective as the only qualification. The result of this survey on teacher qualification supports the literature by Coldhaber and Brewer (2005) who suggest that the type of certification a teacher possesses may influence student outcomes. Miller (2006) also links teachers being knowledgeable in their field to teacher skills in the classroom. Teachers also believed that having a degree in a subject area or having short-term training in a specific subject augured well for helping students relate to SO5, desk-checking an algorithm using a trace table. The fact that teacher certification in IT was absent in some countries could be a possible reason for a disconnect between students and the teachers in this topic.

The programming topics associated with SO4 - writing code using a programming language and SO6 - converting algorithms to programming code and testing them for correctness had higher percentages, whether teachers liked or did not like to teach programming. These topics require higher order skills which will draw on a teacher's knowledge and expertise. Jenkins (2001), supports the results that teachers' liking of a subject or topic could translate to enthusiasm in the students and a better understanding of the topic. Another consideration is that if teachers believe that their students will not understand

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topics which require higher order cognitive skills such as those required in SO6, converting algorithms to programming code, then they will not teach it, but spend time on other topics that offer a higher chance of the student completing it in the exam. With the inclusion of more programming topics in the 2010 syllabus, another survey would be necessary to see how teachers are adapting to its increased coverage, and whether their perceptions of their students' performance would have changed.

CONCLUSION AND RECOMMENDATIONS

These research findings can be used to make recommendations, such as topic-specific teacher training, completion of subject related qualifications, or a review of the programming section's specific objectives to ensure that failure rates are not caused by insufficient time to complete the syllabus. Research on failure rates in programming will also impact on future university enrollment in Computer Science, and Information Technology where programming is an integral part of the curriculum. If students have a dislike or lack of appreciation for programming, then these degree courses will eventually suffer from decreased enrollment or low grade point averages (GPA) (Foster, 2005). Therefore, a clearly defined purpose of the application of programming in the 2010 IT Syllabus would also be a useful requirement, so that teachers and students can identify careers and job positions that would require its use.

"…the reality is that much of this research has not informed our teaching and we are still teaching programming as we did many years ago…" (Kaplan, 2010, p.1)

Glenda Gay is a Lecturer in Management Studies at the University of the West Indies - Cave Hill Campus, and an author of an Information Technology textbook for **CSEC** *students.*

REFERENCES

Anthony, T. D., & Kritsonis, W. A. (2006). Education in a test taking era. *National Forum of Educational Administration and Supervision Journal, 24*(4), 1-11.

Bergin, S., & Reilly, R. (2005). Programming: factors that influence success *Proceedings of the 36th SIGCSE technical symposium on Computer science education* (pp. 411-415). St. Louis, Missouri, USA: ACM Press.

Bills, D. P., & Biles, J. A. (2005). The role of programming in IT. *Proceedings of the 6th conference on Information technology education*, 43-49.

Buck, D., & Stucki, D. (2001). JKarelRobot: a case study in supporting levels of cognitive development in the computer science curriculum *Proceedings of the thirty-second SIGCSE technical symposium on Computer Science Education* (pp. 16-20). Charlotte, North Carolina, United States: ACM Press.

Byrne, P., & Lyons, G. (2001). The effect of student attributes on success in programming *Proceedings of the 6th annual conference on Innovation and technology in computer science education* (pp. 49-52). Canterbury, United Kingdom: ACM Press.

Crossfield, P. J., Daugherty, M. K., & Merril, C. (Fall 2004). Teacher attitudes toward and perceptions of student performance on the design component of the Caribbean **CXC** examination. [Electronic document]. *Journal of industrial teacher education, 41*(3).

CXC, C. E. C. (2004). *Report on candidates' work in the Caribbean secondary education certificate - January 2004*: Caribbean Examinations Council.

Dagdilelis, V., Satratzemi, M., & Evangelidis, G. (2004). Introducing secondary education students to algorithms and programming. [Journal Article]. *Education and Information Technologies, 9*(2), 159-173.

Daley-Morris, P. (2000a). *Introduction of Information Technology to schools in Jamaica* (Educations for all in the Caribbean: Assessment 2000 Monograph No. 22). Jamaica: Office of the UNESCO Representative in the Caribbean.

Daley-Morris, P. (2000b). *Introduction of Information Technology to schools in Jamaica* (Monograph No. 22). Jamaica: Office of the UNESCO Representative in the Caribbean.

EFA, E. f. a. (2000). *The EFA 2000 Assessment: Country Reports*: World Education Forum.

Ekstrom, J. J., Gorka, S., Kamali, R., Lawson, E., Lunt, B., Miller, J., et al. (2006). The Information Technology model curriculum. *Journal of Information Technology Education, 5*.

Forte, A. (2003). *Programming for communication: Overcoming motivational barriers to computation for all*. Paper presented at the Proceeding of the IEEE Symposium on Human Centric Computing Languages and Environments. .

Foster, A. L. (2005). Student interest in computer science plummets. *The Chronicle of Higher Education, 51*(38), A31.

Goldhaber, D. D., & Brewer, D. J. (2000). Does teacher certification matter? high school teacher certification status and student achievement. *Educational Evaluation and Policy Analysis, 22*(2), 129-145.

Guyana, M. o. e. (2003). MOE Strategic Plan 2003-2007 Retrieved Ocotber 20, 2006, from http://www.sdnp.org.gy/minedu/about/s-part1.htm

Jenkins, T. (2001). The motivation of students of programming *Proceedings of the 6th annual conference on Innovation and technology in computer science education* (pp. 53-56). Canterbury, United Kingdom: ACM Press.

Kaplan, R. M. (2010). Choosing a first programming language. Proceedings of SIGITE '10 Proceedings of the 2010 ACM conference on Information technology education. Retrieved on August 12, 2011 from http://dl.acm.org.ezproxylocal.library.nova.edu/ft_gateway.cfm?id=1867697&type=pdf&CFID=39036555&CFTOKEN=11802903

Lister, R., & Leaney, J. (2003). Introductory programming, criterion-referencing, and Bloom. *ACM Press*.

Lunt, B., Ekstrom, J. J., Gorka, S., Kamali, R., Lawson, E., Miller, E., et al. (2005). Defining the IT curriculum: The results of the past 3 years. *Journal of Issues in Informing Science and Information Technology, 2*, 259-270.

McCauley , E. (2004). Thinking about our teaching. *SIGCSE Bull., 36*(2), 18-19.

Miller, E. (May 2006). Teachers, curricula and standards: A commonwealth Caribbean perspective. *Second Meeting of the Intergovernmental Committee of the Regional Education Project for Latin Americal and the Caribbean (PRELAC)* Retrieved November 11, 2006, from http://www.unesco.cl/medios/biblioteca/documentos/teachers_curricula_standards_commonwealth_caribbean_perspective_errol_miller.pdf

Milne, I., & Rowe, G. (2002). Difficulties in learning and teaching programming: Views of students and tutors. *Education and Information Technologies, 7*(1), 55-67.

No Child Left Behind. Retrieved November 4, 2006, from http://www.ed.gov/nclb/landing.jhtml

Parkes, J., & Harris, M. B. (2002). The purposes of a syllabus Retrieved November 10, 2006, from http://jan.ucc.nau.edu/~coesyl-p/syllabus_cline_article_2.pdf

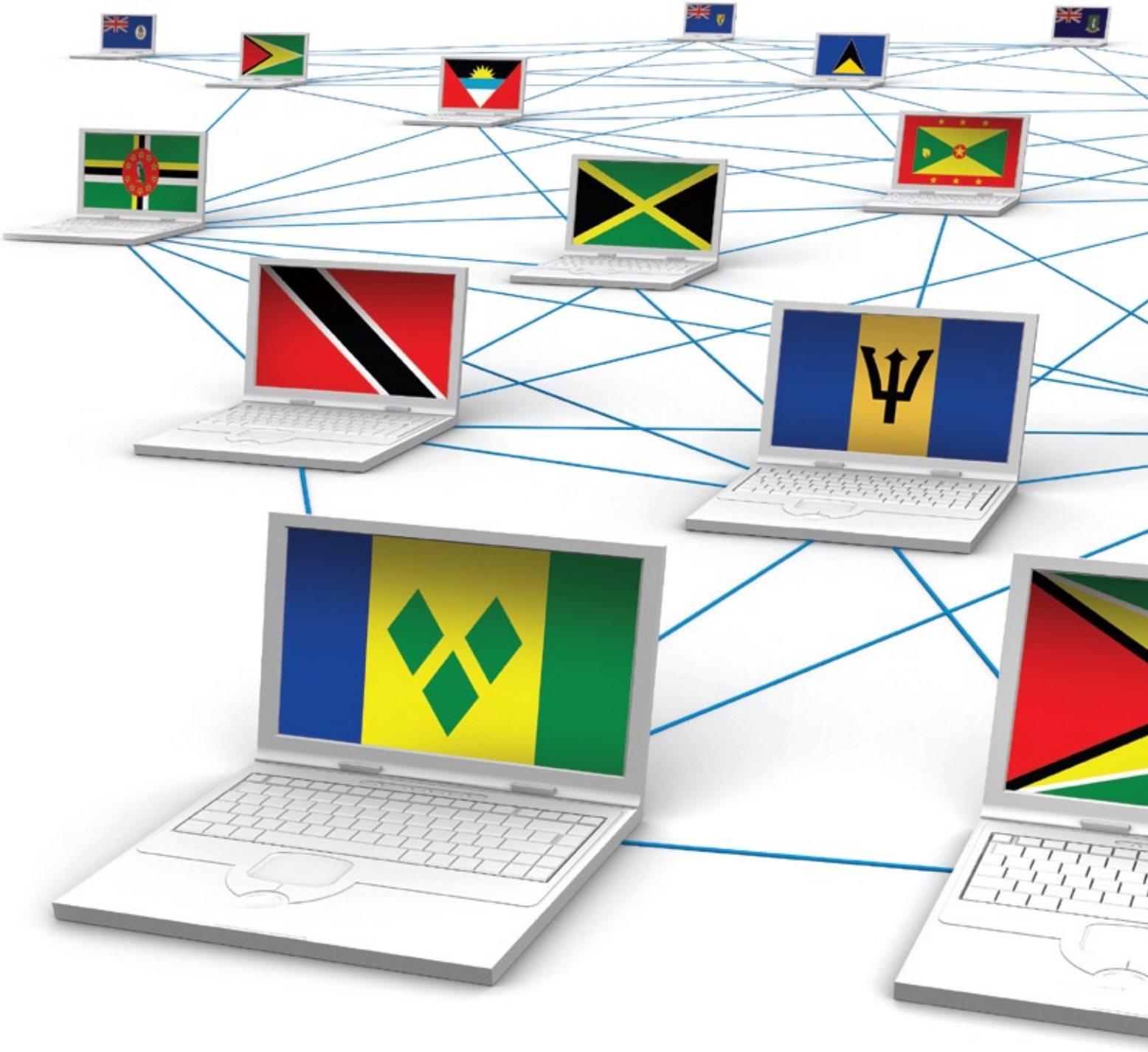
Parris, B. (2000). *A reform initiative: the Barbadian experience*.

Pillay, N., & Jugoo, V. R. (2005). An investigation into student characteristics affecting novice programming performance. *SIGCSE Bull., 37*(4), 107-110.

Trinidad, M. o. e. (2004). How to Become a Teacher in Trinidad and Tobago Retrieved October 17, 2006, from http://library2.nalis.gov.tt/Default.aspx?tabid=84#534

IT INITIATIVES IN CARIBBEAN SCHOOLS

By Gerard Phillip



IT initiatives in schools in the Caribbean

The education systems of countries in the Caribbean region must keep step with advancements in Information and Communications Technology (ICT) in the international community. The knowledge-based, technology-driven new world demands that education systems throughout the region produce citizens with the ICT knowledge and skills to compete successfully in a fiercely competitive global economic environment. In order to meet this challenge, computers and related hardware and software resources must be made available to students in schools. Teachers and administrative staff must be adequately trained and be disposed to the incorporation of ICT in their delivery of instruction and in the automation of administrative tasks. This article gives a historical account of ICT initiatives in secondary schools in Trinidad and Tobago and other selected states in the Caribbean.

INTRODUCTION

Our very survival as a people and as a nation depends on how we face the challenges of life in this global village, where we must compete for space in the international market place; in a global economy that is knowledge-based and technologically-driven, particularly by the Information and Communication Technologies. (Trinidad and Tobago. Ministry of Education [MOE], 2002)

The imperatives of globalization have mandated that new and innovative changes be made to the curriculum in order to equip students with the Information and Communications Technology (ICT) skills and competencies required to meet the challenges of today's technological world. The size, intensity, velocity and impact of global networks, flow and interaction consistent with the revolution and expansion of ICT have forced countries to re-examine education's links with politics, the economy, society and culture. Brunner (2001) postulates that the establishment of a technology based on information and telecommunications systems creates new contexts in which individual's education will of necessity take place.

Globalization has brought new economic, political, social, and cultural imperatives that confront the educational community. The approach to education and the delivery of instruction in particular, must now be reconceptualised if the curriculum is to prove meaningful in today's world. Nordgren (2002) contends that much of what we ask students to learn in this age of globalization is useless. Indeed, we are educating students for jobs that do not yet exist. If we are to provide students with knowledge that is meaningful, relevant, and essential for survival in this competitive technological environment, ICT must be given greater significance in the curriculum and teachers must be trained to employ new methodologies that incorporate ICT in their delivery of instruction.

Students in secondary schools in the region are challenged to adjust to the new imperatives that accompany this new world. They must also be cognizant that virtually every career in today's job market contains an element of computerization and demands that workers be proficient in computer-related technologies.

THE TECHNOLOGY REVOLUTION

Globalization, fueled by the phenomenal increase in Information and Communication Technology, has necessitated a computer-literate work force, with enhanced ICT competence. Several states in the region have failed to produce the required quantum of workers with the IT skills needed to gain employment in local 'high-end' technology-based industries. Campbell and Nugent (2003) suggest that "what's required is a highly skilled working class to compete in the new arena shaped by globalization." They contend that our education system has effectively produced an "intelligentsia that does not have a scientific understanding of the process of capitalistic globalization and the implications for the world in which they live."

Brunner (2001) recommends that schools should be re-engineered to survive in the multi-channel technological world. No longer is knowledge slow, limited and stable. Rather, knowledge is constantly changing and being redefined. The options for acquiring information are now virtually limitless; the teacher is no longer the embodiment of all knowledge in the classroom. Brunner further envisages that educational establishments would increasingly cease to be the sole conduit through which new generations come in contact with knowledge and information, that role being increasingly assumed by the Internet, computerized networks and the burgeoning knowledge industry.

It is widely argued that the real role of the teacher in an information-rich world is not just to provide information, but to guide and encourage students wading through the deep waters of the information flood (O'Donnell, 1996). Educational planners must therefore be cognizant of these realities, and restructure the curriculum to include the new information frontiers such as Information Technology, the Internet, with its attendant protocols; local and wide area computerized networks; telecommunications systems, social media, social networking, and content communities.

INTRODUCTION OF COMPUTERS

It may be useful to reflect on the introduction of computers into the curriculum of schools in the Caribbean region. In the early 1980s when the Apple company launched its Apple IIe, and Time Magazine named the personal computer 'Machine of the Year', many educators and policy makers appreciated the significance and phenomenal potential of the computer as an instructional teaching and learning tool to be used in the classroom. The skepticism and apprehension expressed by educators in the Caribbean was not shared by their counterparts in the developed nations. In schools across North America, Japan, and Europe, Information Technology was being included in the curriculum. Students were being exposed to computers, and instruction was being revolutionized through the use of Computer Aided Learning (CAL) and Computer Aided Instruction (CAI) software applications and CD-ROM. Having missed the start of the race, schools in the Caribbean have been struggling to catch up with the developed world ever since.

A POLITICAL MANDATE

At a conference in Cyprus in 1984, Ministers of Education mandated the Commonwealth Secretariat to provide unbiased advice to assist member countries with the implementation of computers and IT in their education systems. Subsequent to this, the Secretariat, together with the Government of Alberta, Canada, convened a Pan-Commonwealth meeting of specialists, which was held in Edmonton in May 1986. Members from Britain, Canada, Cyprus, India, Kenya, Singapore, Barbados, and Trinidad and Tobago contributed towards a policy document that served as a template for the implementation of Information Technology into the education system of schools in the Commonwealth.

Caribbean governments were challenged to make bold financial decisions in the area of IT, which, despite the substantial initial cost, would impact positively on the society in both the short and medium term. The myopic viewed the estimated financial outlay towards the acquisition of computer hardware as a luxury the region could ill afford. Others, however, were convinced that the introduction of computers and the infusion of IT into the curriculum was an essential step in the quest to close the widening technology gap between the developed nations and the developing states in the Caribbean.

PRIVATE SECTOR INPUT

The rate of computerization and automation of private sector industries placed great demands on educational policy makers and curriculum planners to accelerate the introduction of computers into their education systems. Trinidad and Tobago and Jamaica stood out as being in most urgent need of computer-literate workers. The importation of workers from developed countries with myriad IT skills was counter-productive to the development of indigenous skilled human capital. The introduction of computers in schools, and the incorporation of IT into the curriculum of primary and secondary schools failed to keep step with the implementation of computer technology in the private sector.

The literature alludes to the slow pace of computer technology implementation in the education sector both regionally and internationally, and compares the implementation of IT in businesses to its implementation and use in schools. Although the use of information systems to immediately access accurate and comprehensive data has long been seen by the business sector as being critical to their success, schools have lagged behind in the implementation of IT solutions (Telem, 1993). D'Ignazio (1993) states emphatically that while businesses have been building electronic highways, education has been traversing an electronic dirt road. Many reasons have been proffered for this tardiness. Some have suggested insufficient research as a probable cause. Messner (1999) argues that schools in general are reform-resistant institutions.

THE UNIVERSITY OF THE WEST INDIES

In 1970, the first attempt was made to integrate computers into the university's teaching/learning environment. This was pioneered in the Faculty of Engineering. Ten years later, in 1980, a full degree in Computer Science was offered in the Faculty of Natural Sciences. The university's then Vice-Chancellor, Sir Allister McIntyre, addressing the Eric Williams Memorial Lecture in June 1988, stated that all these strides in microcomputer integration and usage were still "not good enough." He surmised that the region lacked sufficient skilled people in Mathematics, Computer Science, and Engineering and too few were being trained in these disciplines, especially in Computer Science. He added, "in particular, I feel that the aim should be to make every student computer literate. I should add to this, the need to adopt a problem-solving approach in courses and to provide students, wherever appropriate and feasible, with hands-on experience" (McIntyre says high tech important, 1988, p.18).

An article in the 27th November 1987 edition of the *London Times* displayed the headline "Computers to link Islands' Campuses." The article gave details of a gift of 35 microcomputers valued at J$935,000 (£95,000) which were donated by International Business Machines (IBM) to The University of the West Indies' (UWI) distance teaching project. The computers were to link campuses in Jamaica, Barbados, and Trinidad and Tobago, as well as extra-mural centers in Antigua, Dominica, St Lucia, and Grenada, via a leased telecommunications network. The distance learning project was conceived in 1984 by Dr Noel Kalicharan, Senior Lecturer in the Department of Mathematics and Computer Science at the St Augustine Campus. The gift of the microcomputers made the projects' execution a reality.

In December 1996, UWI got its first dedicated line for the Internet. This was made possible by a US$50,000 donation from CONOCO Inc. Professor Gurmohan Kochhar, Dean of the Faculty of Engineering, stated that the funds would be used to open access to hundreds of engineering and other students of the UWI and would also go towards the purchase of additional computer systems. Today, modern microcomputers running on high-speed intranets and local area networks (LANs) are used by the various campuses of UWI for teleconferencing, distance learning, Internet research, message services, and for telecollaboration among students.

THE TRINIDAD EXPERIENCE

NIHERST Pilot Project

In 1984, a pilot project for the introduction of Computer Science in secondary schools was launched by the National Institute of Higher Education, Research, Science and Technology (NIHERST), in association with the Ministry of Education and the School of Education, UWI, under a steering committee charged with the responsibility of overseeing all phases of the exercise. A curriculum committee was established to develop a curriculum for use by the pilot schools in keeping with the broad aims of the programme. Three reasons were cited for the introduction of computers into the education system of Trinidad and Tobago:

- *To foster students' awareness of the nature and uses of computers in order that they could cope with, function in, and promote the advancement of technological societies*
- *To assist in some definitive way in the teaching/learning process*
- *To help with administrative tasks involving information flow, scheduling, and academic reporting*

Fifteen secondary schools were invited to participate in the pilot project. This number was later increased to 30. Each school was allocated four Apple IIE computers, each with 64 MB RAM. Two teachers from each school

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PHOTO BY CSAM / CXC

"Having missed the start of the race, schools in the Caribbean have been struggling to catch up with the developed world ever since."

were selected to undergo an intensive six-week course in computer literacy, with emphasis on programming and proficiency in the use of productivity tools. The project was then handed over to the Ministry of Education. However, the MOE could not identify suitably qualified personnel to coordinate and supervise the project at that time. It was not until November 1985, that Dr Brader Brathwaite was asked to coordinate the project.

Fatima College was one of the first secondary schools to fully incorporate computers into the teaching/learning environment. In September 1985, the school received a cheque for TT$45,000, which facilitated the purchase of a further 12 microcomputers. The Republic Bank-sponsored Computer Lab at the Mucurapo-based school was equipped with 26 Radio Shack TRS 80 computers. The Fatima College Computer Science Centre was used by students of St. Mary's College; St. Joseph's Convent, Port of Spain; Holy Name Convent, Port of Spain; and St. Francois Girls' College.

Edu-Link TT

In 1996, Royal Bank signed a memorandum of understanding with Industry Canada's SchoolNet to provide for the collaborative application of SchoolNet technology to Trinidad and Tobago. In April 1997, Edu-Link TT, an adaptation of the Canada-based SchoolNet, was launched at the Royal Bank Institute of Business and Technology (ROYTEC). The programme was coordinated by Mrs Elphege Joseph, Executive Director of Royal Bank. This initiative implemented a pilot project involving 12 secondary schools in Trinidad and Tobago that were to be connected to Canada's SchoolNet. Pilot schools were to be subsequently partnered with Canadian schools in an exciting and innovative virtual community, affording new opportunities for reshaping teaching and learning.

Working groups, comprising teachers and students of the pilot schools were trained by personnel from Industry Canada. Long-term objectives included the extension of Edu-Link TT to all schools in the country and the setting up of local area networks (LANs) in each school with connections to the school's library and administration office. This was to coincide with the delivery of 364 computers to secondary schools, donated by Amoco Trinidad Oil Company, with additional funding, and more computers, to come from the private sector.

Edu-Link TT received accolades from the World Bank which praised the initiative, lauding the fact that it was initiated by a private sector institution working along with the government to restructure and develop the education system in the country, with particular emphasis on the introduction of ICT. At the 'Global Knowledge 97' World Bank Conference, delegates from several African and Caribbean countries expressed interest in establishing similar programmes in their respective countries.

Edu-Link TT can be credited for coordinating the public/private sector National Steering Committee. In April 1997, this committee produced a vision statement for a national strategy for the implementation of Information and Communication Technology in Education, which stated; "By the year 2005, every citizen of Trinidad and Tobago will have the opportunity to develop to his or her full potential through access to education and training centres equipped with leading-edge Information and Communication Technology" (Royal Bank Customer News, 1997). Members of the Steering Committee included officials from the MOE, IBM World Trade Corporation, Amoco Trinidad Oil Company, TSTT Limited, InterServ Limited, PCS Nitrogen Trinidad Company Limited, WOWNet, CableView Limited, and TV6.

The EDU-Link SchoolNet initiative, however, resulted in only limited success. The project never fully achieved its long-term objectives. The LANs promised were never installed and the stated objectives of collaboration and information sharing between local and Canadian schools never came to fruition.

Used Computers for Schools

The period 1990–2000 saw a proliferation of used computers being donated to secondary schools. As the technology evolved at a rapid rate, companies considered it appropriate and civic-minded to donate their used and sometimes outmoded computers and printers to schools. Several schools, in dire need of computer equipment, and tired of waiting on the MOE, wrote to private sector enterprises asking for assistance in acquiring computers. They took the position that a used or refurbished computer was better than no computer at all. While many of these computers were in good order and put to use in some schools, many other secondary schools became the recipients of redundant and obsolete computer hardware. Other schools, determined to establish and equip their computer labs to ensure that their charges did not leave the school without some measure of IT exposure, employed several innovative fund-raising ventures in order to purchase computers and other peripherals.

Government/Energy Sector Agreements

The impetus for the introduction of computers into local educational institutions on a relatively large scale came as a result of agreements between the government and enterprises in the energy sector. Production Sharing Contracts between the state and oil and gas companies bidding for exploration contracts in the offshore fields were negotiated. The agreements included provision for the government to receive a technical assistance/equipment bonus, which was designated towards the purchase of computer equipment for secondary schools. Mr Ian Furlonge, Curriculum Officer (Mathematics and Computer Science), represented the MOE in these negotiations. Some of the major outcomes from these agreements include the following:

- *In 1997, a disbursement of 240 computers and printers was made to schools as an*

outcome of the production sharing agreement between the Amoco Trinidad Oil Company, Trinidad Gas BV, Repsol Exploration SA, and the government. Each of 20 selected secondary schools (including denominational schools) received 12 IBM computers, each with Pentium processors and 16 MB RAM. Each of these schools also received two dot matrix printers.

- *In July 1997, a production sharing contract bonus agreement between the government; the Dutch company, Shell; and the Italian company, Agrip determined that the companies provide 500 personal computers for primary and secondary schools. These computers were disbursed to selected schools throughout the country. These systems boasted of specifications that include 8 GB hard drives and 64 MB RAM.*

- *In June 1998, the Inter-American Development Bank (IDB) donated 44 computers to secondary schools. Each of 22 schools received two computers each. These computers had a net total value of TT$440,000.*

- *In January 1999, at a ceremony at the Rudranath Capildeo Learning Resource Centre, the Prime Minister delivered 60 computers to 12 secondary schools. These systems were acquired as a result of the Production Sharing Contract signed with CONOCO Oil Company.*

- *In July, 1999, Citibank (Trinidad and Tobago Limited) donated 27 computers to schools. This followed their donation of 19 computers to schools in 1998. Each selected school received one computer system.*

Between 2000 and 2005, many new secondary schools were constructed under the Secondary Education Modernization Programme (SEMP). These schools were commissioned and appointed with computer labs, and equipped with computer systems, printers and other equipment, including multimedia projectors. Funding for the purchase of computers and related equipment was sourced in part through the Schools' Strategic Plan initiative. Many schools submitted their strategic plans, which prioritized ICT in the school's curriculum. These schools were able to draw down on the MOE's allocation of funds, which were utilized towards the purchase of computer systems and peripherals. The intent was to use these computers for the delivery of instruction across the curriculum, and not solely for the teaching of IT.

Two students using a computer at St Joseph High School in Guyana

MOE/SEMP Fujitsu Initiative

In April 2007, the MOE, through SEMP, finalized and signed a major contract with Fujitsu Transaction Solutions Limited. The first phase of which involved the supply, installation, and maintenance of computers, servers, and printers along with an array of software applications to 133 secondary schools in Trinidad and Tobago. This contract provided for the supply, installation and support of state-of–the-art computer systems to every secondary school in the country.

This most laudable initiative was welcomed by principals, teachers, and other stakeholders in the education system. At a workshop for principals of secondary schools held at the Centre of Excellence in March 2007, Project Coordinator, Mr Arnott West, along with several officials of the MOE/SEMP, outlined details of the disbursement, which was intended to support the MOE's Information and Communications Technology Policy:

- *The computer systems and peripheral devices would be fully networked, utilizing both hard-wired and wireless network configurations.*
- *Three servers would be installed at each school.*
- *The staff room at each school would be equipped with six computers/laptops and three printers.*
- *The main administration office would be networked and supplied with a computer and a printer.*
- *Three laptops would be supplied to support the school's Technology Education curriculum.*
- *Twenty computers would be supplied to the school's computer lab.*
- *Six computers would be assigned to the school's library to facilitate student research*
- *Two computers would be assigned to the library staff to facilitate automated book rental and resource management.*
- *Four teachers from each school would be selected for training in Network Administration at five-day workshops administered by the UWI School of Continuing Studies.*
- *Teachers who attended the Network Administration programme would gain access to online training in the use of productivity software.*

Laptop Computers for SEA Graduates

In 2010 the government took the novel decision to extend the supply and delivery of computers not just to schools, but directly to students. Every student who entered secondary school, having successfully completed the Secondary Entrance Assessment (SEA) examination was given a 'fully-loaded' laptop computer. Twenty-four thousand laptops were

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purchased at a cost of US$83 million from the Hewlett Packard Company for distribution to these students. In effect, this meant that the entire Form 1 population of students in secondary schools in Trinidad and Tobago was afforded the convenience and utility of having their own personal laptop computer for use both at school and at home. The government has signaled that the initiative would be continued each year. A $US53 million contract was awarded to Chinese computer manufacturer Lenovo for the supply of 17,300 laptop computers for students who entered Form 1 in September 2011. Each computer is expected to cost approximately $US460.00. Education Minister Dr. Tim Gopeesingh assured SEA graduates that distribution of these laptops would be completed in two weeks beginning in mid-September 2011.

INITIATIVES ACROSS THE REGION

In Trinidad and Tobago, the MOE has responded to the need for a clearly enunciated policy on ICT. The "Policy for Information and Communication Technology in Education" (MOE, 2007) acknowledges that "ICT is critical to the transformation of the society to ultimately meet the universal requirements of an ever changing global environment." It alludes to the position that "ICT in education would enhance human capacity and dynamize the teaching/learning environment". The policy acknowledges that IT is a critical part of the curriculum and is imperative for the country's economic development. The Trinidad and Tobago experience, though singular, is not unique. Throughout the Caribbean schools have had similar experiences.

Grenada

Schools in Grenada suffered a great loss of computers and other hardware equipment when hurricane Ivan struck the island in 2004. In 2007, the Grenada Government took the decision to improve and upgrade the ICT infrastructure in both primary and secondary schools. The nation's 21 secondary schools were each supplied with computers, including laptop computers. Local Area Networks in all schools were either reinstalled or upgraded and outfitted with servers. Over 50 per cent of primary schools were outfitted with computer labs and relevant software for delivery of instruction across the curriculum. Additionally, electronic white boards and other digital instructional media were delivered to both primary and secondary schools to aid in the delivery of instruction. Attention was given to teacher training. Scholarships have been awarded for teachers to pursue certification in IT and Computer Science at the University of the West Indies.

Guyana

The Government of Guyana, having recognized the potential of Information and Communication Technology (ICT) to empower Guyanese to meet developmental challenges and strengthen the economy, launched the ICT in Education Strategy in 2009. The role of ICT in International Trade is making industries more competitive, in facilitating e-commerce, in the health and education sectors and in simply making a wide range of information and services available electronically is fully recognized. The Government has therefore outlined various policies that were aimed at creating an environment that would foster technology use and encourage investment in ICT, with the Education sector being one of the most critical areas.

The National Centre for Educational Resource Development (NCERD), a department within the Ministry of Education, was tasked with delivering all continuous professional development programmes for in-service teachers. The Unit was brought on stream in 2009 and a five-year work programme was outlined. The ICT Unit within NCERD was mandated to:

- *Train all teachers to the basic computer literacy level by 2012*
- *Manage all schools with computer laboratories – 65 Primary, 80 Secondary*
- *Implement SuccessMaker Software into the 50 schools which includes training of 2000 teachers in the use of SuccessMaker*
- *Train all secondary school teachers to deliver the Caribbean Examinations Council Information Technology and Electronic Document Preparation and Management Syllabi (109 teachers)*
- *Research and develop modules for all aspects of ICT training within the education sector*
- *Identify, train and implement low cost technologies with the schools system, example - Jolly Phonics, Television, DVD's, White Boards.*

As part of their five-year work programme, it is expected that all 13,000 teachers in Guyana would be computer literate and empowered to incorporate IT in their teaching. To date 3,500 teachers have been trained in Basic Computer Literacy, 30 schools are running SuccessMaker successfully, and 109 secondary school teachers are competent to deliver Information Technology and related subjects to students. The number of students writing IT related subjects has tripled in the last 2 years.

Barbados

The Barbados education reform initiative, the Education Sector Enhancement Programme (ESEP) was started in 1998 with the mandate to modernise the country's education system. The goal of ESEP was to fully equip all schools with new IT equipment in adequate quantities to effectively integrate Information Technology into the curriculum, thereby promoting positive values, adequate skills and favourable attitudes necessary for life in the 21st century. Estimated to cost US$68.9 million, the programme provided for the supply and installation of computers and computer-related equipment, software, and networking infrastructure in the classrooms, staff rooms, libraries and administrative offices of all secondary schools. Other technologies introduced include printers, digital cameras, scanners, plotters, science probes, electronic whiteboards and multimedia projectors. It was envisioned that all of the mentioned technologies would assist teachers with their preparation and presentation for classroom instruction, build student skills and competencies, foster integrated learning across subject areas and promote higher levels of student interest and achievement.

Objectives of the programme included the training of teachers, revision of the curriculum and the installation of technology equipment. A phased approach was taken, with schools brought into the programme over a seven-year period. Initially, pilot schools were refurbished and supplied with various IT tools intended to improve teaching and learning in the classroom and automate administrative tasks. Teachers were specially trained to use technology in the classroom.

Prior to this initiative by the Ministry of Education and Human Resource Development, schools were forced to function with very limited computer hardware resources and, in some instances, relied on equipment loaned from the Audio Visual Aids Department of the Ministry of Education or from Erdiston Teachers' Training College.

At present, all secondary schools in Barbados are fully furnished with computers, printers and other hardware, used in networked environments. Administrative offices at schools have all been supplied with hardware and software for automation of services, including the generation of students' reports online for remote access. Emphasis has been placed on the training of teachers to integrate the use of IT in their teaching. All secondary schools have IT coordinators who assist teachers to incorporate IT into their delivery of instruction.

Jamaica

Several initiates have been undertaken towards the implementation of IT in the curriculum of schools in Jamaica. One of the earliest initiatives was the establishment of a model computer education centre at St. Andrew Technical High School in 1983-84. This was funded by Control Data Corporation, a U.S-based computer firm. In 1986, the Ministry of Education and Youth, aided by funding from the UNDP, introduced a pilot project at Montego Bay High School in a computer laboratory built by the school's Parent Teacher Association. Students from surrounding schools accessed the facility, utilizing specially chosen Computer Aided Learning (CAL) software.

Throughout the 1990s, the Ministry of Education and Youth, in collaboration with the Jamaica Computer Society Education Foundation (JCSEF) implemented programmes to improve the quality of education in Jamaican schools through the introduction of computer technology. Support for the initiatives was received from the Business Partners for Education, the Human Employment and Resource Training Trust/ National Training Agency (HEART/NTA) and other stakeholders in the private sector.

Jamaica 2000 Project

In 1992, the Jamaica 2000 Project was launched. The project aimed to furnish computer laboratories in each secondary school, community college and teachers' college with 15 computers, and to provide in-service training in IT to teachers. The project was supported by the JCSEF in partnership with the HEART Trust/NTA and the private sector through the Business Partners. The initial aim of the project was to provide opportunities for students of the upper secondary schools to pursue Information Technology and Computer Science in the **CXC** examinations. The HEART Trust contributed approximately J$60M to this initiative. School communities provided space for the computer laboratories by constructing laboratories or converting existing space, securing the facilities and providing electrical installation. School communities contributed 20 per cent, the HEART Trust contributed 40 per cent and the Business Partners 40 per cent of the costs required. The Jamaica 2000 Project realised the establishment of 83 computer laboratories in parishes across Jamaica.

Notwithstanding these initiatives, and quite similar to the experience of secondary schools in Trinidad and Tobago, several schools, in furtherance of their own development plans, undertook their own fund-raising projects in an effort to provide computers and related technology equipment at their schools. Their efforts were largely supported by members of the business community and alumni or Parent Teacher Associations.

e-Learning Jamaica

Jamaica 2000 was succeeded by e-Learning Jamaica (e-LJam). Sharing a vision for an educated and knowledge based people; the Ministry of Education and Youth (MOEY) and the Ministry of Industry, Technology, Energy and Commerce (MITEC) collaborated on this innovative project. It aims to improve education in Jamaica's high school system, through the use of Information and Communications Technology (ICT). E-Ljam represents a comprehensive project, addressing overall enhancement of teaching and learning using ICT to support constructivist pedagogy, authentic assessment, and other change strategies. The main goals of the e-Learning Jamaica Project are to improve the quality of education, enhance the learning experience and ensure a high level of success in **CXC** examinations.

The pilot was implemented in Grades 10 and 11 of 28 schools and three teachers colleges across Jamaica. Deliverables included the supply and delivery of desktop computers, laptops, laser printers, digital video cameras and network servers to every secondary school. A school network which connected the computer laboratories, libraries, staff rooms, A/V centres, resource rooms and administrative blocks to broad band access to the Internet was to be implemented. Schools would receive in excess of 50 computers. The project acquired, customized and developed teaching materials on various media, and provided textbooks, CD's and videotaped lectures on DVD's to students. In addition, all 11,000 teachers in the high school system will be trained in basic ICT skills and in the use of the materials and equipment for instructional delivery. Major achievements of the e-Ljam project include:

- *Training and certification of over 13,500 educators in the integration of ICT*
- *Distribution of hardware and software to over 95 per cent of secondary schools*
- *Development and distribution of instructional materials – over 12,000 test items provided on DVDs and on e-Ljam websites.*
- *Development and distribution of School Management Software*
- *Scholarships to lecturers at Teachers' Colleges to pursue Master's degrees in Ed. Tech (online).*

THE WAY FORWARD

Ministries of Education in respective territories of the region, the business community, teachers, parents and other stakeholders must be applauded for recognizing that a highly skilled and educated workforce with the requisite knowledge and skills in ICT is critical to the region's sustainable economic and social development. Over the last five years, several schools throughout the region have been supplied with computers and related hardware and software, as well as networked operating environments. The investment has not gone unnoticed by teachers and students throughout the system. The initiatives have resulted in improved academic performance for students attempting Information Technology examinations. Over the past six years (2005 – 2010), an average of 74 per cent of candidates have obtained Grades I – III in **CSEC** Information Technology. The benefits to students attempting other subjects across the curriculum and the value added to their self-esteem and self-efficacy consistent with their access to Information Technology is immeasurable.

It must be acknowledged that a vast number of students in schools in the region have not been as fortunate as others. In such schools, access to ICT systems and the implementation of technology-assisted teaching and learning remain an elusive dream. Students must be afforded access to the tools which would shape their lives. Competence in Information Technology has become indispensable. IT has revolutionized teaching and learning, brought distant locations closer, radically altered communication and information transfer and rendered the world a global village. Education planners and policy makers of the region must keep step with the cutting-edge of the IT revolution. No effort or resource should be spared in ensuring that Information Technology becomes permanently entrenched in the school curriculum and that teachers are trained and empowered to incorporate digital technologies in their delivery of instruction across the curriculum. In today's technologically-driven educational environment there might very well be a correlation between successful educational institutions and access to state-of-the-art Information Technology tools and systems.

Gerard Phillip is an Assistant Registrar - Syllabus and Curriculum Development based at **CXC***'s Western Zone Office in Jamaica. He is a former Panel Member for* **CSEC** *and* **CAPE** *IT syllabuses.*

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REFERENCES

Brunner, J. J. (2001). Globalization, education and the technological revolution. *Prospects, 31*(2), 131–148.

Campbell, T. A., & Nugent R. K. (2003, November). Globalization and the crisis of the Caribbean intelligentsia. *Trinidad and Tobago Review*, pp. 20– 22.

Cogburn, D. (1999). Globalization, knowledge, education and training in the information age. Retrieved February 28, 2008, from http://www. unesco.org/webworld/infoethics_2/eng/papers/paper_23.htm

Computer to link islands' campuses. (1987, November 27). *London Times*, p. 16.

D'Ignazio, F. (1993). Electronic highways and classrooms of the future. In T. Cannings & L. Finkle (Eds.), *The technology age classroom*. Wilsonville, OR: Franklin, Beedle, and Associates.

Mclntyre says high tech important. (1988, June 22). *Trinidad Guardian*, p. 18.

Messner, R. (1999). Pedagogical school development between the new culture of learning and the growing pressure to modernize. *European Education*, *31*(4), 22–57.

Nordgren, R. D. (2002). Globalization and education: What students will need to know and be able to do in the global village. *Phi Delta Kappan*, *84*(4), 318–321.

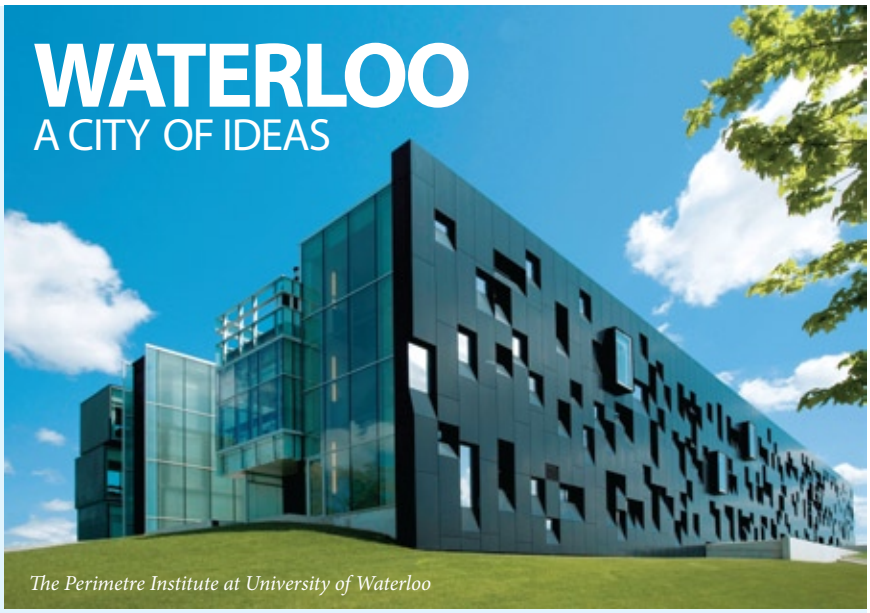
O'Donnell, J. (1996), The digital challenge. *Wilson Quarterly, 20*, 48–49.

Royal Bank Customer News. (1997, July 21). ROYTEC Edulink highlighted at World Bank Conference. *Trinidad Guardian*, p. 11.

Telem, M. (1993). Information technology: A missing link in educational research. *Journal of Research on Computing in Education*, *26*(1), 123–142.

Trinidad and Tobago. Ministry of Education. (2002). *Strategic plan, 2002–2006.* Port of Spain, Trinidad.

Trinidad and Tobago. Ministry of Education. (2007). *Draft policy for information and communications technology in education*. Port of Spain, Trinidad.



The Perimetre Institute at University of Waterloo

The forefront of ideas – that's where the City of Waterloo lives. Under development in its backyard are the BlackBerry (In 1984, Mike Lazaridis, a fourth-year Engineering student at Waterloo founded his own company: Research In Motion, maker of the BlackBerry® smartphone), Google enhancements, and more ideas are about to become reality.

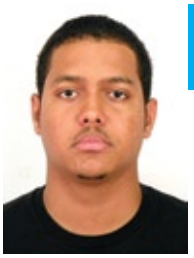
The city's goal is to attract the best and brightest minds from around the globe; to be a centre where technological advancements are created and shared with the world. And these efforts are already producing results!

- **Named the 2007 World's Most Intelligent Community**
- **Ranked in the top 6 Canadian cities in 2010, ahead of Toronto, Vancouver, and Montreal**

You'll find Waterloo in Canada's technology triangle, just 100 kilometres west of Toronto. While other cities are plagued with job losses and hurting from the economic downturn, Waterloo is thriving – 2,000 jobs are currently waiting to be filled, many in the approximately 700 high-tech firms located in the area. Big names like Research in Motion (makers of the BlackBerry), Open Text, ATS Automation Tooling Systems, and Com Dev have head offices in town.

Focusing on digital media, information technology, software, computer hardware, and advanced manufacturing, these companies have found an ideal place to develop and test their ideas. A major advantage is the presence of two international think tanks and three world-class institutions -- Conestoga College; Wilfrid Laurier University; and the University of Waterloo, where 22 per cent of all spin-off technology companies in Canada can trace their origins.

It's clear that in just over 150 years, one factor has remained constant in the city of Waterloo – ideas.



A STUDENT'S VIEW OF CXC® IT AND COMPUTER SCIENCE OFFERINGS

A recipient of the Regional Top Award for Computer Science reflects on the **CAPE** *Computer Science and* **CSEC** *IT offerings as he graduates from university with a degree in Computer Science. He also makes bold recommendations for the two subjects.*

By Vincent Taylor

It was not until I matriculated into the University of the West Indies to pursue my Bachelor of Science degree in Computer Science that I fully appreciated the scope of what **CSEC** Information Technology and **CAPE** Computer Science covered. Both courses are very good for the most part, and right off the bat provide strong foundation for future work in ICT.

CSEC Information Technology is a solid introduction to computing on a whole and the applications of computer systems in business. After completing **CSEC** Information Technology, one should be able to manage basic computer system troubleshooting as well as perform rudimentary tasks using popular office productivity software.

CAPE Computer Science puts a bit of polish on what was covered at the secondary level, but seems to put more focus on preparing a candidate for tertiary level education as opposed to preparing them for the world of work. That may or may not be the intention of the **CXC**, but that is how it came across to me after completing the **CAPE** Computer Science course back in 2008.

CSEC Information Technology, as mentioned above, does a good job of introducing core concepts of computing and office productivity software to the new student. It covers hardware, programming, and application software such as word processors, spreadsheets, and database management systems. This training is of utmost importance for the student who will be entering entry-level positions in businesses after high school. It may come as a shock to some, but I have seen firsthand large organizations and institutions that do not seem to have grasped the concept of a mail merge, which a 16-year-old **CSEC** Information Technology student is equipped to do. I think that is a step in the right direction.

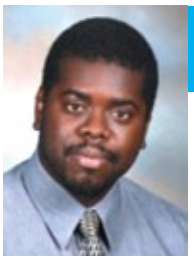
Looking back, I think that the syllabus should have introduced computer networking and given solid introductions to using the Internet for information gathering and research. Perhaps introducing students to the various web technologies could also be incorporated, since that is the direction where mainstream computing seems to be heading. Back in 2006, I would have loved students at the **CSEC** level to be able to build basic websites using simple HTML and CSS. I think it also would have been good if alternate software packages were mentioned. In my opinion, students need to know that there are alternatives to the software offerings from Microsoft.

It was at the tertiary level (UWI) when **CAPE** Computer Science really shone. I was miles ahead of my peers who did not have that subject under their belt. I think **CAPE** Computer Science gives excellent introductions to software engineering and the computer as a problem-solving tool. The introductions to networking were excellent as were the introductions to computer based systems. Software engineering was delivered especially well, and it was helpful to already be familiar with the material in my second year of university when I saw software engineering again. The networking topics covered by **CAPE** Computer Science were also well delivered and I was once again miles ahead of my peers in my third year of university when we looked at computer networking and communication in detail.

As with **CSEC** Information Technology, I think an introduction to modern web technologies would not hurt and would certainly sharpen students for work in that field. Mainstream computing is heading to the Internet or the "cloud" if you may, so I see no reason not to guide students in that direction from the outset. What I have noticed at the tertiary level, and what is troubling, is that students are particularly terrible at problem solving. This applies to both students who have and have not done **CAPE** Computer Science, but undoubtedly worse for those who didn't. I think special emphasis should be placed on the algorithm as the sequence of steps required to solve a problem. At first glance, it may seem that the problems faced by the students stemmed from a lack of understanding of a new language that they were not necessarily familiar with. This is certainly not so, as any good programmer will tell you; the language can be written from reference material as long as the core concepts of the language are understood. The problem, as I would later figure out, was that tertiary level students were not able to say, in English, the steps required to solve a particular problem. Whether it is a deficiency in their training up to that point or whether it is a deficiency in their general reasoning ability is yet to be proven, but it is a major obstacle which needs to be overcome if our next generation of ICT professionals are to be able to make meaningful contributions to the region.

I would like to say that the **CXC** has done an excellent job of preparing students for entry-level work in small business as well as prepare others for further studies at the tertiary level. There is just a hint of reluctance to embrace and introduce to the student new technologies such as the Internet, open-source technologies, and mobile applications to name a few. If I could be so bold, I would like to remind the **CXC** that the ICT sector and Computer Science in general are very dynamic in nature and are probably the fastest growing and fastest changing areas in the world today. I would reasonably expect new technologies to be introduced to the syllabus at least every two years. If I could be bolder still, I would recommend all countries across the region to make Information Technology mandatory at the secondary level. The simple fact is, at that young age, our students need to be exposed to what the world of ICT has to offer. ICT is much more than a spreadsheet or database or programming. It is comprised of a global network of information exchange using cutting-edge technologies and high speed communication. Our students need to see that side of the field. They need to be interested. They need to be yearning for more. Only then can we truly say that our students are ready to make meaningful contributions to the region and the world now and into the future.

Vincent Taylor is a Jamaica Scholar (2008) and recently graduated from The University of the West Indies with a B.Sc. (First Class Honours) in Computer Science and Electronics.



A TEACHER'S PERSPECTIVE ON CAPE® COMPUTER SCIENCE AND CSEC® IT

In the last five years, Campion College has produced three of the five recipients of the **CAPE** *Regional Top Award for Information and Communications Technology (formerly Computer Science). One of the teachers at Campion College outlines his recipe for the students' success and his views on the* **CSEC** *IT and* **CAPE** *Computer Science syllabuses.*

By Lavare Henry

As a school we are very proud of the performance of all our students and as such we are elated at our continued impressive showing both locally and regionally in the **CSEC** IT and particular the **CAPE** Computer Science offerings by **CXC**. I, however, do not take any personal praise for the performance of my students as I believe that I am merely a facilitator in the classroom. It is the students who are required to do all the work and have done all the work.

In today's world of the modern educator, the teacher is expected to take full responsibility for the students' (the learners') education and therefore if the student has not learnt the teacher has not taught. I do not share this philosophy. In my classroom, as I have always said to my students, "I am not trying to make you pass or to get a Grade I. I will however equip you with all the tools necessary to get the Grade I if you so desire". It must be a shared responsibility. It is not my Grade I but theirs. I have a responsibility to be on-time for class and to be prepared, to conduct the necessary research and to try to explain the subject matter with clarity. It is my responsibility to give as many assignments as possible and to mark them as quickly as possible to give the students the necessary feedback on their work. It is my responsibility to assess those who are weak and to offer support and extra help where relevant. This includes looking at the students' different learning styles and all the other buzz words that are out there. They (my students) have a responsibility to work hard by reading ahead of class and coming into class prepared to ask sensible questions. They have a responsibility to take careful notes as the lesson is explained and assignments are given. They have a responsibility to complete all assignments on-time and properly, to seek clarity on an assignment well in advance of the due date when they are unclear as to what to do. They have a responsibility to pay attention in class and to study comprehensively for tests and exams. I believe that part of our success as a school is that we have many students who understand their responsibility and therefore with the help and support of their parents do the necessary work. They are not expecting teachers to make them get a Grade I, they are prepared to do the work.

I see all my students as having the ability to do well and get Grade Is. Therefore, I teach all my classes as if these are the kinds of students that I have. My expectation of them is high and for the most part they deliver. The moment you give-up and feel that the kids are just dunce and beyond your help, is the moment that you refuse to teach some topics because you feel it is just too hard, and that's the moment students go into an exam being unprepared. Upon entering my class, the students are placed under pressure to do all assignments. One thing my students know is that my assignments must be done and it must be done on-time. I ensure that as much as possible I teach all my Computer Science students to act as professional programmers; they are required to solve complex programming tasks that I believe is within their ability. They are required to perform them at a high standard. I give very clear guidelines as to what I want, and they are required to go do the necessary research. This way they learn critical thinking and also problem solving.

I like the current **CSEC** IT syllabus with the exception that we have such a very practical area which I believe is not properly assessed. Though I understand the rationale for no longer doing a practical exam for IT, I believe that such a practical subject area cannot adequately be accessed via SBA and the theory papers that now exist. I think the old assessment method went much further in allowing students to demonstrate whether they have mastered the relevant IT skills.

The **CAPE** Computer Science syllabus needs to be revised in its present form. The Unit 2 content on data structure is better taught using an object oriented approach and an object oriented language and not a procedural approach as the syllabus now requires. I believe that it is now the norm everywhere else in the world to teach this concept as I have suggested. The concept of data structure in my view is too abstract and complex to be taught with C. An object oriented language will provide greater clarity to the concept of a data structure specifically and an ADT in general. I would like to see the syllabus reorganised as follows:

Unit 1	
Module 1	Architecture
Module 2	Operating Systems and Networks
Module 3	Programming
Unit 2	
Module 1	Advanced Programming (Data Structure)
Module 2	Programming Languages
Module 3	Software Engineering

The focus of the IA should also change. Currently the Unit 1 and Unit 2 IAs are virtually clones of each other and therefore redundant. The Unit 1 IA according to my suggestion would have a more architecture, OS and networking focus while the unit 2 IA would be more focused on program development. I think that these suggestions will go a long way to enhance the **CAPE** Computer Science offering.

Lavare Henry teaches Computer Science at Campion College, Jamaica.

"In today's world of the modern educator, the teacher is expected to take full responsibility for the students' (the learners') education and therefore if the student has not learnt the teacher has not taught."

CSEC® INFORMATION TECHNOLOGY– MY JOURNEY TO SUCCESS

The NCU team in China Town, Japan. From left to right: George Long, Project Advisor: Kenrie Hylton, Romaine Carter, Cleon Green and Keron Tooma

The story of a former student whose love for IT has taken him around the world and back, thanks mainly to the foundation he received from doing **CSEC** *IT in high school.*

By Keron Tooma

BACKGROUND: ST JAGO HIGH

My interest in Information Technology (IT) dates back to my time at St. Jago High School. I was one of the fortunate few who were qualified to take IT classes. Students were selected based on their performance in their mid-term and end-of-year examinations; and having ranked first in my class, I was given the privilege to do IT in third form. Indeed, it was a privilege back in those days when the computer lab at the school only had about (20) computers.

Our school based assessments (SBAs) were very time consuming, and although we had extra classes after school, it was sometimes not enough to produce the quality of work required. I remembered that I had an uncle who was working in the IT industry at the time and so I approached him and he gave me an old IBM computer with Microsoft Windows 95. It was not all that, but it got the work done, and so I was able to put in enough work to score well on my SBA.

During the time I sat the IT exam, there were still two proficiencies, Technical and General. I sat the Technical Proficiency, as this was the one offered at my school. My exam experience was a bit dramatic to say the least. We had a power outage that lasted for several hours and because there was no backup power, arrangements were made for us to complete the exams at the neighboring St. Catherine High School. Now, we were still using floppy disks at the time and some of my data had gotten lost in the power outage, and so when we arrived at the new center I had to start all over again. However, in the end, I was able to pass my exam comfortably.

COINCIDENCE OR NOT: NCU

I arrived on the campus of Northern Caribbean University (NCU) feeling like the happiest student in the world. I had high hopes of entering the medical field, but those hopes were quickly dashed with the reality that I had no money and to study medicine would require a lot of cash. I thought to myself, "what is it that I am good at?" There were only two things, Art and IT. My parents never wanted me to study Art so there was only one other option, IT. In light of this fact, I decided to switch my programme of study from Biological Sciences to Computer Information Systems (CIS). This was a very easy transition to make, because I had already received a solid foundation through the Caribbean Secondary Education Certificate (**CSEC**) IT.

SOLID FOUNDATION (CSEC IT)

CSEC IT provided the start to my university education that I needed. With the fundamentals already established, it was a very easy move. I had sufficient knowledge of the introductory course that I started out with, so much so that I got all As in my first semester, while other students struggled. **CSEC** IT was certainly a motivating factor for moving forward. The discipline required to succeed at this level had already been sewn and was now bearing fruits. I grew very passionate about IT and learning, to the point where I was tutoring my classmates about concepts that seemed difficult.

GLOBAL IMAGINATION

I excelled in my studies and achieved several awards and scholarships. One such scholarship was the Digicel Scholarship, which enabled me to complete my final year of university. My exploits in IT and programming became global

CSEC *Information Technology– My Journey to Success*

when I entered the Microsoft Imagine Software Design Competition in 2005. I teamed up with three other students from NCU and entered the Software Design competition under the theme "Imagine a world where technology dissolves boundaries". The competition was open to universities all over the world. Our software application was a communication system that allowed translation to and from different languages in real-time. The application was designed to be installed on a mobile or smart device and to serve as a traveller's assistant, which not only translates languages, but also educates its users with cultural information about a particular country or region, such as customs, norms, belief systems, and taboos.

Having competed for the first round, we came out on top in the country eliminations beating all the other universities in Jamaica. Having made it to the second round, we came out on top of our Caribbean rivals and moved on to the regional finals in which we beat teams from Central America, including Costa Rica, Guatemala and Honduras. This gave us our tickets to the world finals in Yokohama, Japan in 2005. At the finals the team made it through the first two rounds, but was eliminated in the third round. This was an amazing achievement not only for NCU, or for us, but also for Jamaica, as this was the first time that the competition had been introduced to the island by the software giant, Microsoft.

INSPIRING THE YOUTH THROUGH INNOVATION

Today, I make presentations and conduct lectures, inspiring students to pursue a career in the IT industry. I consider myself an 'IT Evangelist'; having had the opportunity to teach at various levels of academia. I have always sought to encourage and motivate students to reach their full potential and achieve greatness, using my experience as an example.

IT – WINDOW TO THE WORLD

It is an indescribable feeling to see students following your example. A number of students who I have taught **CSEC** IT are now studying or working in IT-related fields. My siblings are so inspired that they have decided to study IT as well.

In a world that is immersed in technology and with computers being so ubiquitous, the need to be computer literate has become more evident to even the more mature persons in our society. With our lives being more and more dependent on digital technology, the need for understanding these technologies become increasing important and necessary. Gone are the days when IT knowledge used to be limited to only a few "nerds." Today, many students across the Caribbean are seeing the necessity for IT. **CSEC** IT has given me the foundation I needed and it will undoubtedly prepare many more students to compete in our ever-changing global village, and to become tomorrow's change agents and leaders of innovation.

Keron Tooma is a scholar, lecturer and computer literacy specialist, and has taught at the secondary and tertiary levels. Currently, he is pursuing his Masters degree in Information Systems Security.

E-LEARNING PORTALS IN CARIBBEAN EDUCATION

By Dr Carol Granston & Dr Didacus Jules

INTRODUCTION

In the past five years, the most significant technological innovations with implications for education have been in the realm of software – new ways of (net)working, new capabilities and exponential increases in personal computing power that enable an individual to process massive amounts of data and information. The impact of these innovations in the realms of communication, connections, conversations and community (4C's) has direct and profound implications for the teaching/learning process:

COMMUNICATION – *instantaneous and not constrained by distance*

CONNECTIONS – *new forms and ways of social networking; the sharing of computing power; the ability to find people based on common interests*

CONVERSATIONS – *ranging from the simple one-to-one mode to the more complex, involving unlimited numbers of persons; individualized but mass outreach; multiple communication nodes*

COMMUNITY – *reflecting multiple identities; individuals able to participate in many virtual communities of shared interests and identity*

These new possibilities in the 4C's can fundamentally change and enhance learning. Learning is no longer restricted to the highly formalized structures of the traditional school. It can happen anywhere, at any time; it can be highly individualized even while being made universally available. The teaching function becomes more of a facilitating function that can take many pedagogical forms. It can involve the sharing of existing knowledge or the creation of new knowledge. Beyond the focus on knowledge acquisition is the imperative of developing skills and competencies and, in this process, the facilitator can be a skilled trainer (as opposed to a trained teacher) with industry or professional expertise.

A common fallacy is that all these new and emerging technologies make it possible for us to do what we have traditionally done in a more engaging manner. This is a limited perspective that is unconsciously replicated in the notion of integrating ICT in education. For many, this means simply adding and making use of the new technologies in our traditional, didactic modes of educational delivery where teaching and learning are dominated by the teacher. The real power of the new technologies lies in the fundamental redefinition of teaching and learning that they enable. It is not about integration but transformation. Used at their fullest potential, the new technologies render it impossible to teach and to learn in accordance with the old prescriptions and paradigms. In the first instance, the distinction between teaching and learning itself is redefined, as is the rigid differentiation between teacher and learner. Both teaching and learning become a tighter dialectic that is focussed on the discovery of knowledge that happens in a more participatory manner as learners become partners in the learning process.

Attention must therefore be paid not only to the effective use of the technology but equally to the context in which learning occurs. Jenkins (2009) argues that "rather than dealing with each technology in isolation, we would do better to take an ecological approach, thinking about the interrelationship among different communication technologies, the cultural communities that grow up around them and the activities they support."

PLACEMENT OF E-LEARNING PORTALS IN CXC

CXC's strategic vision acknowledges the fact that the old methods of *chalk and talk* are no longer adequate for the requirements of learning in the 21st Century. Today's learners are "digital natives" who *think and process information differently* from their predecessors (Prensky, 2001). At home, our children are exposed to technologies of play that excite them and engage them in multi-sensory ways. If our schools are to make learning fun and motivate our children to learn, they must transform the technologies of play into technologies of learning. At the adult level, the demands of work and life make it difficult for working people to pursue continuing education by traditional means and learning portals provide an anytime solution to their needs.

As an examination board, we are often challenged by policy makers about our contribution to performance and improved certification. As a regional body, we have made significant contributions to education in the Caribbean, not only through the provision of world-class certification, but also in the harmonization of secondary education and in building the capacity of teachers. We have recognized the need to be flexible and responsive to the changing education lands**cape** and the environment as well as the need to stay relevant and current.

E-Learning Portals in Caribbean Education

CXC's role in the region

- *Need to provide both teachers and students with access to high quality learning resources to support/facilitate the delivery of syllabuses*
- *Need to transform* **CXC** *process and structures according to global education reform agenda*
- *Develop communities of learning among* **CXC** *stakeholders to facilitate information sharing, collaborative generation/creation of knowledge and the sharing of resources.*

These roles can be easily facilitated through e-learning portals that have the potential to provide both teachers and students with access to any-time, any-place support as well as develop learning support systems that are based on collaboratory structures.

THEORETICAL UNDERPINNING

E-learning portals have the capacity to engage students in learning activities that are interactive, participatory and create learning environments where participants can collaborate with each other to generate knowledge. Learning is essentially a social process. The social view of learning posits that learning is not often the result of teaching, but relies heavily on the establishment of a social framework that facilitates learning. This social framework is built on interaction as students work collaboratively to solve problems and discover meaning. By connecting through various e-learning portals, teachers and students can harness the capabilities of various ICT tools to share information and collaborate within schools, across schools within the same territory and across the region. Through various social media tools such as Face book and Twitter, teachers and students can easily collaborate and interact across borders.

The teaching learning process has traditionally relied on textbooks as the medium for transmission of knowledge. The shelf life of textbooks is becoming shorter as the rate of change of knowledge is exponential. Very often by the time a text is published, new knowledge and information has emerged that impacts the currency and accuracy of the text. In response to this challenge, some publishers are providing access to websites on which supplementary information or updates are posted. While texts might well be around for a long time to come, the trend points to increasing reliance on learning portals for real-time, up-to-date provision of content and for collaborative knowledge creation.

CHALLENGES OF ICT IN EDUCATION IN THE CARIBBEAN: IMMEDIATE NEEDS/ FUTURE DIRECTION

ICT is the "big new thing" and literally everyone is getting on board and there is a rush to show movement on that front. The danger of the present situation is that insufficient thought is being put into the planning of ICT; and very often initiatives are launched in the absence of policy. As a result, there is a lot of symbolic action – getting a computer is seen as the sign of real modernization of the classroom, but the issue goes far beyond these simple actions.

ICT in education must start with a clear policy conception that establishes the rationale and parameters of its use in education. This should serve as a roadmap of how the country intends to roll out the technology and the intended impact that it seeks to attain. All of the environmental and contextual concerns need to be taken into account since the effective use of ICT is not solely the provision of hardware, but ensuring robust bandwidth, identifying useful software, training of teachers, attending to the electrical and security infrastructure in schools, and reshaping the pedagogy to maximize the opportunities provided by ICT for collaborative learning, individualized instruction and creative expression.

In the Caribbean today, the ICT lands**cape** is cluttered with duplication of effort and insufficient convergence. Within the region and even within each country, there is a multiplicity of stand-alone projects seeking to do the same things – building learning portals, designing websites etc. Almost every government department has its own website with no uniform government branding; in the majority of cases, these websites serve as little more than sophisticated brochureware – just providing information. Web technology today allows us to go so much further! A vast array of government services can be offered online at tremendous cost savings to the public purse and with much greater speed and efficiency than the old way of working.

CXC's approach to ICT is based on the following clearly established principles:

- *Enables us to work smarter*
- *Enables us to work more cost effectively (reducing cost of service or saving time)*
- *Adds value to the relationship with stakeholders*

ICT IN AN IT INTELLIGENT ORGANIZATION

CXC is moving rapidly to become an IT-Intelligent Organization – an organization that leverages ICT to deliver faster, cheaper and better. Internally, ICT is being used to streamline our core processes so that departments can work more collaboratively and seamlessly, produce their deliverables faster and more accurately, and automate some functions. The in-house use of ICT involves:

- *Use of DocuShare – for document and content management including secure virtual preparation of syllabuses and examination papers*
- *Advanced use of Outlook to manage the corporate calendar, schedule meetings and track tasks*
- *Use of e-Requester to manage the requisition of goods and services*
- *The installation of a Human Resource Management Information System to handle all transactional HR matters from recruitment to leave processing and including payroll notifications*
- *Use of Versatile – for archiving and record management*
- *Establishment of a Digital Printery equipped with state-of-the-art Xerox print-on-demand equipment processing 1.5 million impressions per month.*
- *A unified communications system (UCS) – enables communication across several platforms using voice over IP. Desk phones, blackberries and computers are now part of an integrated communications platform that allows us to work as a seamless organization.*

The technology used for stronger stakeholder management and better direct delivery of services includes:

- *Candidate registration portal… now enabling year-round registration of candidates*
- *A markers' portal for management of examiners*

"Online resources and social media can ignite tremendous enthusiasm if used in the context of collaborative enquiry in which learners take more responsibility for their learning..."

Howard Rheingold – Stanford University (Harvard Business Review Sept 2011).

E-Learning Portals in Caribbean Education

- *Regular personalized e-mail blasts to specific groups of stakeholders (examiners, Ministry of Education policy makers, teachers, principals)*
- *An online portal for immediate feedback on the progress of the examination marking exercise and for customer service feedback*
- *Portal for the online release of* **CAPE** *and* **CSEC** *results*
- *An integrated framework for social networking that includes a website (www.***cxc***.org), Face book, Twitter, YouTube and U-Stream*
- *Notesmaster (www.notesmaster.com) – we have just formalized our partnership with Notesmaster to be the one-stop learning portal for all things* **CXC**. *This portal goes beyond the mere provision of exam-related content, but importantly constitutes a platform for teachers and students to work collaboratively. It enables the creation of groups of all kinds and the Virtual Subject Associations are being constituted in this space (see article in this issue on Notesmaster and its features).*

The social networking architecture of **CXC** is being constantly refined to ensure that each channel reinforces the other and that the needs of every specific constituency are addressed. We have defined our stakeholder world to ensure this unambiguous identification of key interests and our priority outreach is being segmented: candidates (students young and old), employers, education institutions, parents and governments (including Parliamentary Opposition).

The centrepiece of the entire effort however is the community of learning that resides in Notesmaster.

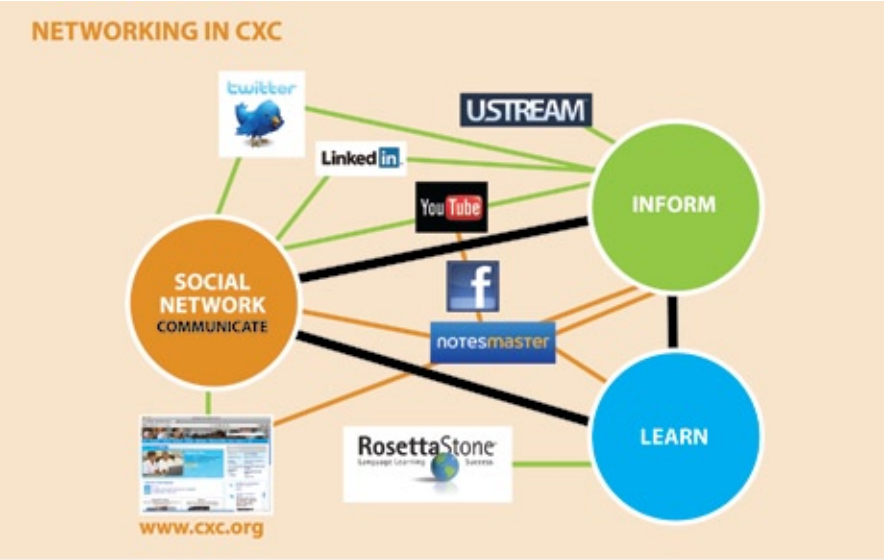
BIBLIOGRAPHY

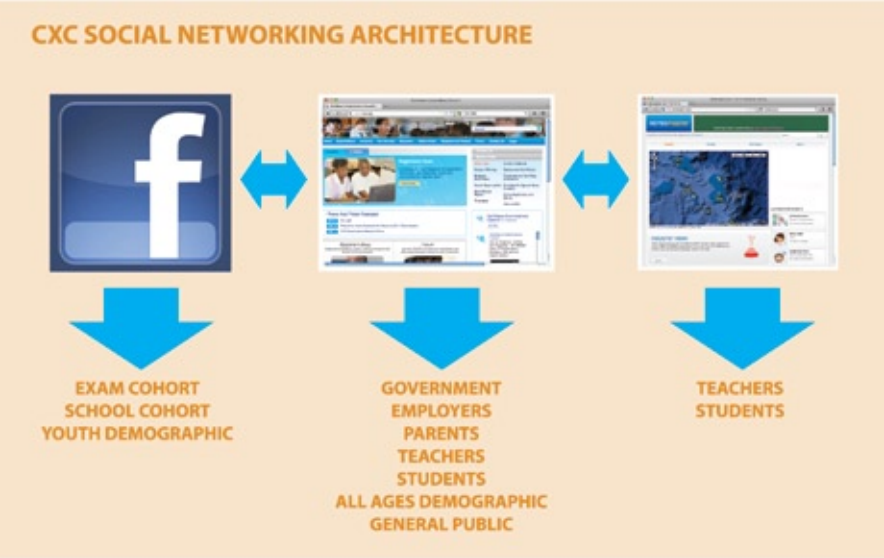
Jenkins, H. (2009) Confronting the Challenges of Participatory Culture: Media Education for the 21st Century. MacArthur Foundation: USA

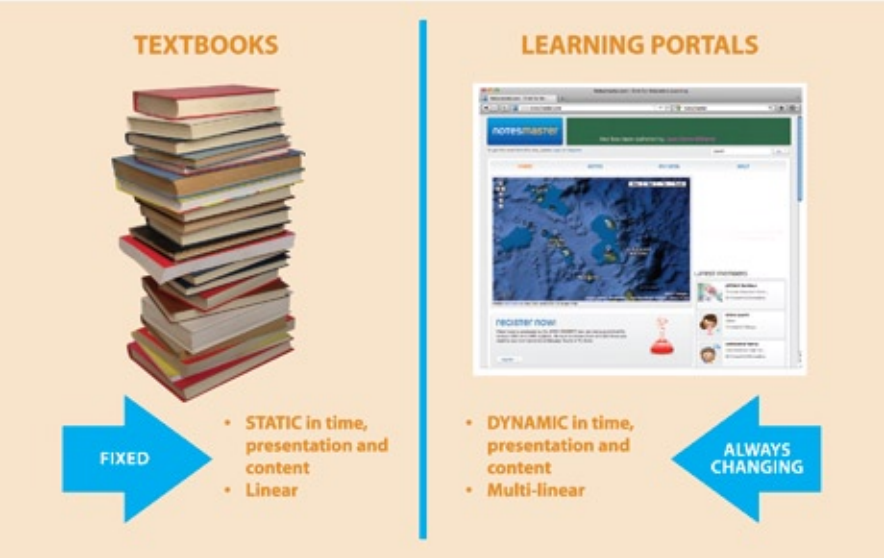
Prensky, M. (2001). Digital Natives, Digital Immigrants. Available online at http://www.marcprensky.com/writing

Dr Carol Granston is the Senior Assistant Registrar, Curriculum and Syllabus Development at **CXC***'s Western Zone Office in Jamaica.*

Dr Didacus Jules is the Registrar and Chief Executive Officer of **CXC**.







NOTESMASTER: A PORTAL FOR EVERY CXC® STUDENT AND TEACHER

By Jason Raymond

In 2004, when the idea of creating an online resource specifically for students and teachers in the Caribbean was conceived, it was a belief held by myself and a few colleagues at St George's College (Jamaica), that Information Communication Technologies (ICTs) could empower teachers and learners, promote change and foster the development of 21st century skills.[1] At that time data to support this belief was limited, and even today, data relevant to ICT and education in the Caribbean is still limited.[2] The reality at the time was that many students were already utilising ICT, and in particular the Internet as a means of disseminating and gathering information for academic purposes. There was also a noticeable absence of online material relevant to the **CXC** syllabuses. As a **CAPE** Economics teacher back in 2004, I encouraged my students to e-mail me their draft school based assignments (SBAs) as it facilitated direct feedback on their work without the need for re-writing or re-printing on the part of the student. Of course, back then many teachers and students did not have easy access to an Internet-enabled computer, and even today though far better, easy access is still an issue as indicated by the 27.5 per cent overall Internet penetration rate in the Caribbean.[3]

Currently, what is most exciting in the Caribbean are the recent government backed programmes focused on improving access to ICT in education. These include the One-to-One Laptop Computer Initiative in St. Kitts, eConnect and Learn (eCAL) in Trinidad and Tobago, and the long standing eLearning Jamaica (eLJam) project. While it is reasonable to expect that these programmes will help promote ICT literacy among those in education and ultimately a narrowing of the digital divide in the not too distant future, the fundamental question to be considered is: what will our students use the newly acquired technology to achieve? It is in response to this question that the provision of credible sources of online educational content tailored for the **CXC** curriculum becomes even more relevant, not just as an afterthought, but as an integral part of any initiative aimed at improving ICT access in education.

NOTESMASTER MODEL

Notesmaster is the product of a core vision; which is the creation of a good educational resource that is as inclusive as possible, given the significant positive externalities attributable to improved education, such as the potential to enhance regional economic development. After much consultation with colleagues, students, educators and institutions, four years of development and several iterations, Notesmaster (**www.notesmaster.com**) was launched in October 2008. Notesmaster is a purpose-built Internet application based on industry standard technologies which harnesses the global networking capacity of the Internet. Being highly scalable, Notesmaster supports a regional user base of teachers and students and effectively manages user generated content in a dynamic syllabus framework comprising all the **CSEC** and **CAPE** subjects. Being free to access, regional in coverage and relevant to the **CXC** syllabuses, allows Notesmaster to offer something for every **CXC** teacher and student.

NOTESMASTER'S CORE AREAS

A core feature of Notesmaster is the Notes area. This contains a digital syllabus for all **CSEC** and **CAPE** subjects and allows published content to be effectively stored and also easily located for viewing by users. It is also worth noting that the term 'content' includes, but is by no means limited to text, images, videos, audio, and interactive applications. Students and teachers are therefore able to interact with published content and even save selected content for later review by adding it to their personalised syllabus, found in the My Desk area.

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[1] Trucano, Michael. 2005. Knowledge Maps: ICTs in Education. Washington, DC: infoDev / World Bank. [online] http://www.infodev.org/en/Publication.154.html [Accesses 10 August 2011]

[2] InfoDev. 2009. Survey of ICT and Education in the Caribbean: Regional Trends and Analysis (Volume 1). [online] http://www.infodev.org/en/publication.441.html [Accesses 10 August 2011]

[3] Internet World Stats. The Caribbean. [online] http://www.internetworldstats.com/carib.htm [Accesses 10 August 2011]

Notesmaster: A Portal for every CXC Student and Teacher

My Desk contains 90 per cent of Notesmaster's features and allows registered users to customise their work space by selecting only those subjects they are studying or teaching. Every user is able to enjoy a personalised experience by populating their personal collection of subject syllabuses with relevant content which educators have published to the Notes area. Students and teachers can also create their own interactive content using Notesmaster's online Editor and the familiar syllabus structure, which acts as a guide by allowing created content to be stored privately under each specific objective or shared with others. To further assist users with the online creation of notes and assignments, all users can freely utilise available resources from Notesmaster's Image Library or upload their existing images and documents to their personal library.

There are several other key features to be found in the My Desk area and these allow users to send internal emails, organise activities in their personal calendar and manage their profile of subject syllabuses as their needs change. Given the number of features Notesmaster offers students and teachers, the best way to learn about them is to experience the portal first hand.

NOTESMASTER 2011-2012

The 2011-2012 academic year will see the release of Groups, a major addition to Notesmaster. This will enhance the entire networking experience by facilitating greater interaction among users, collaborative working and the involvement of educational organisations including schools and ministries of education. Another major release is the implementation of a systematic peer review mechanism to screen content. This further addresses the issue of content quality by giving subject teachers the opportunity to review and constructively critique the work of their peers. These new features to the Notesmaster portal are designed to both promote and take full advantage of the regional network which exist, thereby creating a regional educational resource capable of not just accommodating, but also mobilising every **CXC** teacher and student. By being structured around the **CXC** syllabuses, increased networking among students and teachers greatly improves the chances of generating multiple sets of freely contributed, re-usable educational content from the growing online community. Once shared, this content can be viewed, discussed, re-mixed and peer reviewed to produce quality derivative content through a sustainable multiplier effect. This helps ensure that Notesmaster continues to offer something for every **CXC** teacher and student.

Jason Raymond is the Technical Director at Notesmaster Ltd.

RASHARD BRATHWAITE – NOTESMASTER HELPED ME

In this era, characterised by the ever-evolving expansion of technology and knowledge, the importance of information and communications technology in education cannot be overstated. The partnership between **CXC** and Notesmaster can only redound to the benefit of the students, the education system in the Caribbean, and therefore to the further development of the region.

On a personal level, Notesmaster was extremely instrumental in my success at the **CAPE** level. Notesmaster represented a best-practice viz-a-vis preparation for the examinations. Firstly, a close eye on the syllabus of the subjects under examination allowed for advance preparation and a detailed review to ensure that all necessary areas were covered. The well-prepared notes can serve to supplement the materials provided to students within the classroom setting and can be an even greater resource tool for independent students. Additionally, the notes provide an excellent base for greater research. Due to my personal experience, I gladly recommend this website with absolute certainty. The hours spent reading materials on Notesmaster will truly expand one's ability to interface with the syllabuses for the **CXC** examinations.

Moreover, Notesmaster as a free site is also representative of a greater principle, that education as a tool for social change must not be limited to those who can best pay for it. To resort to additional tutors and additional books as tools to bolster preparation for examinations has the ability to severely limit students of certain socio-economic backgrounds from reaching their full potential. This platform gives to these students, the ability to better realize their goals.

CXC and Notesmaster must truly be commended for these steps to truly integrate our regional education into this modern paradigm. Students, with this tool, you are better poised to succeed at the **CSEC** and **CAPE** levels. I wish you the very best!

Rashard Brathwaite won the Dennis Irvin Award for the Most Outstanding Performance in the **CAPE** *May/June 2009 sitting. He is now a Law student at UWI Cave Hill Campus.*

ICT AND CARIBBEAN INTELLECTUAL COMPETITIVENESS CLOSING THE KNOWLEDGE GAP

By Bevil Wooding

INTRODUCTION

Much has been said and written of the transformative role that Information and Communications Technology (ICT) has played in the modern era. The impact and influence f ICTs on life, commerce, governance and society is undeniable. It is a foundation for industry and competitiveness and a catalyst for innovation. It is one of the most powerful factors shaping life and defining modern society.

In the Caribbean region too, there is wide recognition of the value of building knowledge-based economies and of investing in technology-driven systems. Those are fundamental components of economic and national development. There is also no denying that the technology revolution is exposing antiquated infrastructure and institutional processes; testing the philosophy and approach to education; highlighting the imperative for new approaches to human resource development; and creating new, strategic challenges for business, education and political leaders alike.

In fact, advances in technology have exacerbated the vulnerability of states to externally developed and controlled intellectual capital. Critical areas such as food production, health care, energy, transportation, telecommunications and national security are now heavily (and in some cases wholly) dependent on technology and intellectual property that originates externally. The central role of information and communications technology in modern society amplifies the debate on priority and significance of deliberately cultivating and securing indigenous intellectual capital.

THE KNOWLEDGE ECONOMY

Over the past several years there has been a lot of talk, in the region and around the world, about the need to build the "information society" and, the need to develop "knowledge-based" societies. However, many still struggle with what these concepts mean and how to actually bring it to pass.

To understand the concepts we must first acknowledge the evolving significance of information. Information, or more precisely, the appropriation, dissemination, consumption and control of information, has become central to the organisation of society, the economy and the human experience. The value of information is best realized when it results in knowledge that impacts social and economic development. This is why the terms "information society" and "knowledge-based economy" are commonly used together. The knowledge-based economy has been described as the economic counterpart of the information society, where wealth is created through economic exploitation of information,

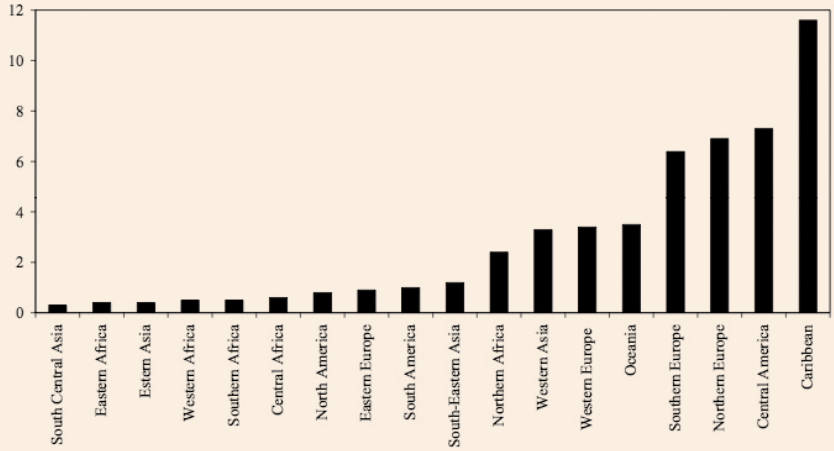
facilitated by technology-based systems. So in knowledge-based economies, knowledge derived from access to information and not just material assets, becomes the platform for economic power.

However, because technology distribution is inherently uneven across regions and nations, there is an inequitable capacity for nations to create wealth through the economic exploitation of information. Evidently, one cannot exploit what one cannot harness. The unevenness of technology distribution within countries and across regions creates a knowledge gap. The technology playing field is, therefore, not even, nor is it reasonable to expect that it ever will be. However, unlike technology, intellectual capital presents a level playing field. In this respect, there is no First or Third; Developed or Developing world. And yet; there is a knowledge gap.

What then is the link between technology capital and intellectual capital that allows countries to achieve and sustain the economic advantages? The answer is deliberate and strategic investment in human resource development. The knowledge economy requires a continuously replenished pool of highly educated, highly skilled knowledge workers.

The irony is that intellectual resources being used to create and maintain the knowledge gap that benefits the developed world, are being taken from the developing sectors of the globe. This is often referred to as the brain drain. An examination of highly skilled migrant programs in North America and Western Europe makes it clear that the developing world maintains the edge that the knowledge gap affords them through a **global** human resource development policy. Remember, in the knowledge-based economy, human capital is the most important asset.

Figure 3. Percent of Labor Force that Has Migrated to OECD Member Countries: Caribbean vs. the Rest of the World, 1965–2000



Source: Docquier and Marfouq (2004).

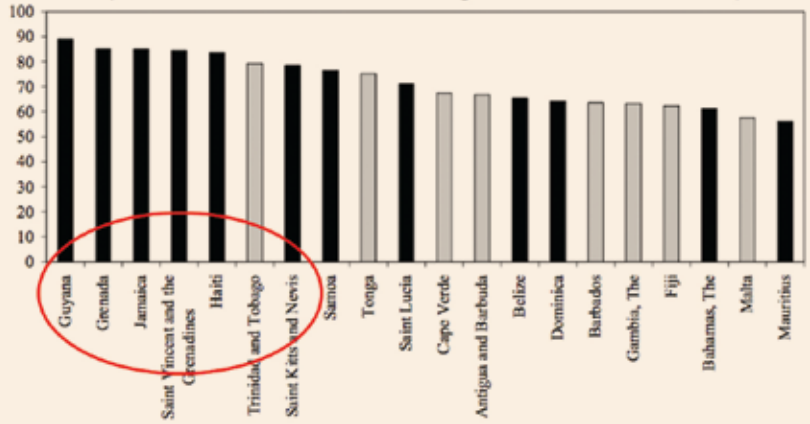
Analysis based on work by Docquier and Marfouk (2006) on international migration by educational attainment for 1990 and 2000 reveals brain drain is strong in small countries that are close to major Organisation for Economic Co-operation and Development (OECD) regions, that share colonial links with OECD countries, and that send most of their migrants to countries with quality-selective immigration programs. Their work also highlighted that the brain drain increases with political instability and the degree of social fracture at the origin and, decreases with natives' human capital.

In other words, the developed world has discovered that the key to development is strategic investment in people…not merely their own, but ours!

Consequently, the knowledge gap is not primarily a technology issue, but more fundamentally a human capital issue; the effects of the knowledge gap cannot be remedied by the acquisition of new technology. People, we are hemorrhaging. Thus, the critical first step to dealing with the knowledge gap is enlightened leadership. This understanding raises three key issues for regional leaders:

1) What are the causes of the hemorrhaging of our people to the developed world?
2) Can the problem be effectively addressed on a national scale or must we collaborate to come up with regional solutions?
3) Can the knowledge gap be closed if we find more effective ways to strategically invest in our people and create more regional opportunities that employ their skills to our benefit?

Figure 6. Top 20 Countries in the World with the Highest Emigration Rates, 1970–2000 (Percent of Educated Labor Force that has Migrated to OECD Member Countries)



Source: Docquier and Marfouq (2005).
Note: Educated labor force is defined as having 12 or more years of completed schooling.

MIND THE GAP

There is a saying 'every new solution arrives with its own set of new problems." While technology has crafted new pathways to development, it has also created challenges with respect to the human dimension of the development process. It is precisely this dilemma that prompted Albert Einstein to state ominously "*It is appallingly obvious that our technology*

ICT and Caribbean Intellectual Competitiveness

exceeds our humanity."

Our technology has certainly come a long way since the days of Einstein. The question remains, has our humanity made the journey with it?

Technology does indeed create the pathway to a viable future but it ultimately will not succeed without a defined under-layer in small developing and increasingly paralyzed states. The description, definition and construction of that under-layer are the most critical present demand upon our leaders. We must recognize that the human resource potential to invent and to innovate exists today. The technology to implement exists today. What we face is more a challenge of paradigm than of technical possibility.

The ultimate goal of all technology appropriation must be human development. The challenges to this objective are not systemic in nature. They are ethical and moral and their very existence brings our entire development approach into question.

Many nations have formulated development agendas in pursuit of statistical definitions of 'First World' status. **These agendas have often failed to deal with issues that affect the 'real' people on the ground** by sacrificing manifest, actual change in human living conditions for false realities that can be manipulated into an imaginary existence on paper.

"The irony is that intellectual resources being used to create and maintain the knowledge gap that benefits the developed world, are being taken from the developing sectors of the globe. This is often referred to as the brain drain."

Unequal income distribution, entrenched poverty, uneven development among sectors of society, have ensured that nations though having statistically attained developed status, still have the realities of underdevelopment living within their borders. **Nations that pursue technology development and innovation outside of a pre-determined moral and ethical framework run the risk of building technology infrastructures without achieving human development**.

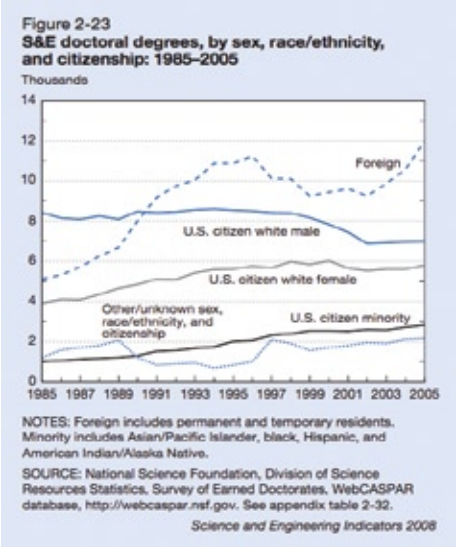
Therefore, an approach to national development does not begin with budgets or strategic plans, or even consideration of human resources, technical capacity or technology. It begins with defining a vision for a preferred future and *then* building a society with the appropriate mindset and collective faith to bring it to pass.

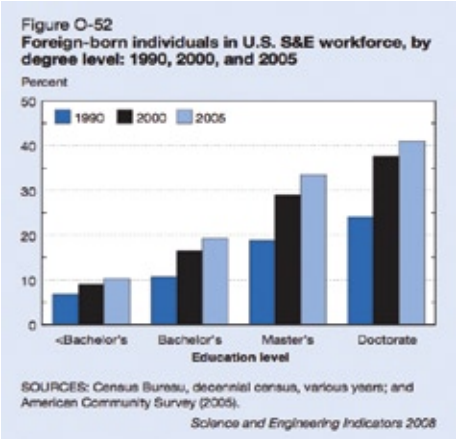
A QUESTION OF LEADERSHIP

These issues place a unique emphasis on the role to be played by Caribbean leadership in defining the environment and context within which technology-driven development can be fully leveraged. Enlightened leadership must provide the vision and an enabling environment to allow the powerful creative potential of our peoples to be fully unleashed. Only then will we seize the opportunities available to foster innovation in the application of ICT to indigenous challenges. Remember, in the knowledge-based economy, human capital is the most important asset.

A new development philosophy must be **driven by our collective realization of the impending danger of inaction**. We must build a strong ethical base that undergirds the technology agenda. We have to guard against the divide that is emerging, not just in terms of the difference in quality and speed of access to ICT, but in terms of the ethical platforms that underpin the ICT development agenda.

Ultimately, development that does not alter the condition of the mass of society in real, positive terms is not development at all. Measurable and broad-based **human development is the only acceptable marker of true development** and should be the primary motivation of the architects and builders of the region's development thrust. It is the ethical challenge to our development process that must be confronted by the highest levels of Caribbean leadership if we are to protect our intellectual capital and truly emerge as a model Caribbean civilization.





Bevil Wooding is a Caribbean technology pioneer and a strong advocate for the adoption of technologies and transformation of governance systems to advance the development of the global information society. He is the Chief Knowledge Officer of international nonprofit, Congress WBN and has facilitated seminars and workshops on e-government, ICTs and national development and in the US, Africa, Europe and the Caribbean. A tireless technology evangelist, he also serves as an Internet Strategist with the US research nonprofit Packet Clearing House to the design capacity building workshops and supports critical Internet infrastructure for Governments, ISPs, policy-makers, and research communities regionally and internationally.

CXC NEWS

CPEA – ASSESSMENT FOR LEARNING
not just another examination

By Benita Byer

The Caribbean Examinations Council (**CXC**) is currently piloting its latest examination product – the Caribbean Primary Exit Assessment (CPEA) – which, it is anticipated, will be the single primary exit assessment for all candidates, thereby replacing the individual examinations written by candidates in each region. Given the diverse and unique curricula of the region, the focus of the CPEA will be on the assessment of the common literacies required by all pupils who have completed primary education. The assessment will comprise external tests as well as an internal assessment component encompassing a project, book reports, writing tasks, teacher developed tests and opportunities for pupil self-assessment and peer-assessment.

ASSESSMENT OF LEARNING, ASSESSMENT FOR LEARNING

The traditional external examinations written by pupils in the final year of primary education are summative and are designed to determine how much of the information and content learned by the pupils can be recalled and reproduced on the test paper. They are, therefore, an *assessment of learning,* and while the resulting scores do provide a measure of what pupils have achieved their strengths and weaknesses, in most cases the performance of pupils is also compared with that of other pupils in the class, school or territory.

The scores earned in these examinations are considered *final* and will be recorded as the performance of that pupil in the primary course of study. Further, these scores may be used to judge the quality of education at the school and as qualification for entry to prestigious secondary institutions. Given the expectations of parents for their children to achieve "good" scores and the resulting pressure placed on teachers and schools to produce the best pupils, teachers may resort to teaching to the test, excluding meaningful activities that are critical to the overall development of the child. Although research on how children learn, proposes that they learn in many different ways, this form of assessment assumes that the entire primary achievement of a child can be determined in a series of tests, often written on a single day.

The CPEA model incorporates *assessment for learning* as a major component of the instructional process to address the issue of the one-shot examination. It requires regular formative assessment throughout the period of study.

L to R - Nicholas Goldberg - Dominica, Patricia Benn - Antigua and Barbuda and Francis Williams - St Vincent and the Grenadines are very attentive during one of the presentations at the CPEA Stakeholders' Seminar

The twelve defining features of the assessment model are:

1. *Developing among pupils, teachers and parents a shared vision of why assess in the Primary schools, what to assess and how to assess.*
2. *Making the assessment process within each school participatory, dynamic and flexible.*
3. *Viewing assessment as composed of two main facets; formative assessment as assessment for learning and summative assessment as assessment of learning.*
4. *Using assessment results with a well-defined feedback process to ensure that all pupils have the opportunity to achieve their potential.*
5. *Aligning assessment with curriculum and instruction.*
6. *Giving pupils multiple opportunities to demonstrate their competencies.*
7. *Basing inferences on multiple sources of evidence.*
8. *Assessing holistically pupils' competence in language arts, mathematics and science.*
9. *Giving credence and recognition to teachers' informed judgement about pupil's performance.*
10. *Viewing pupils as active participants in the assessment process.*
11. *Establishing inferences from test scores to include at least three domains: curricular domain, cognitive-meta-cognitive domain and real world domain.*
12. *Viewing teachers as critical leaders of the assessment process.*

Teachers will be quick to remind that they continuously administer tests, mark such tests and share the marks with their pupils. However, formative assessment is much more than administering frequent tests at regular intervals in the school year. If teacher feedback is missing and the learner is not given the opportunity to improve his or her performance, the assessment cannot be considered formative but is essentially summative assessment during the term. Formative assessment demands that the teacher, as instructional leader, provides regular feedback to his or her pupils on the quality of work produced, as well as advice on how the individual's work may be improved. Consequently, data on pupil performance is collected over time from a variety of sources and the pupil is provided with the necessary materials and scaffolding to ensure improvement.

In this model, the pupil becomes an active participant in the learning process and takes some responsibility for his/her learning. Pupils will be required to participate in a variety of school-based activities, receiving regular feedback from the teachers before their performance is assessed and the results combined with the scores on the external assessment to determine a final measure of overall performance. The school-based activities will include authentic tasks such as investigations, research, portfolios, oral presentations and project work which will be assessed through the use of appropriate checklists and rubrics. Through this approach, pupils will develop social skills such as working in teams, sharing, listening and communicating clearly, skills which will prepare them for successful social interaction with other students beyond the primary grades and ultimately colleagues in the work force.

These classroom activities will be complemented by both teacher and pupil developed tests, involving pupils in collaborative processes such as self assessment and peer teaching and assessment. While initially it may

CPEA – Assessment for learning, not just another examination

be difficult to envisage pupils developing tests for their peers, many pupils welcome the opportunity to perform the role of the teacher and, similarly, pupils may respond more positively to feedback and criticism given in their language than to that provided by the teacher.

One other critical player in the CPEA model is the parent. It is expected that there will full parental support and involvement to ensure the successful implementation of formative assessment. Teachers must work collaboratively with parents who can serve as resource persons, provide learning experiences to support the work of the school and generally be active participant in the learning process.

THE WAY FORWARD

The CPEA proposes a system of assessment where pupils are no longer passive participants in the learning environment but will instead perform numerous roles as researchers, mentors, teachers and performers, among others. None of these roles or the requisite skills is unfamiliar to the primary child, what is unique is that the pupils will be given credit for honing these skills and demonstrating competence in these skills over time. This will require a reorganisation of the school community as we know it and a redefinition of the roles of all stakeholders – school administrators, teachers, parents and the pupils themselves. With the support of ministries of education, teachers' colleges and the examining board, all agents in the process can ensure the success of the model thereby guaranteeing that the products of our primary system are well educated, confident young people ready to face the challenges ahead.

ASSESSMENT FOR LEARNING	ASSESSMENT OF LEARNING
Data source is internal	Data source is external
Data is collected over time	Data is collected one time
Data is used to improve learning	Data is used to measure learning

Benita Byer is an Assistant Registrar - Measurement and Evaluation with **CXC** *and is one of the officers assigned to the CPEA.*

CXC NEWS

MINISTERS APPLAUD CULTURALLY RELEVANT CCSLC® TEXTS

The newly-launched English and Mathematics text books for the Caribbean Certificate of Secondary Level Competence (**CCSLC**) have been lauded by Ministers of Education in two **CXC** Participating Territories.

Honourable Ronald Jones, Minister of Education and Human Resource Development in Barbados delivered the feature address at the launch of the texts in Barbados on 20 June 2011 at the Savannah Hotel.

"Learning is a complex process which hinges on the development of critical analysis and contextual understanding," Minister Jones stated, "often children cannot relate to the material in some books because it does not cater to or draw on their experiences...using books which are more relevant to the knowledge and experience of students can more readily aid the development of these two critical skills."

In noting the Ministry's support for the joint initiative between **CXC** and UK publishers Nelson Thornes, the Minister said he is pleased by the regional flair of the texts which makes them more appealing to students in the region.

"The difficulty of any text must therefore be seen to vary for individual students, depending, not only on the skills they possess, but also their understanding about the cultural context and the situation in which they engage the text," Jones, a former teacher told the audience of educators who had gathered for the launch.

The texts were written by Caribbean experts and mostly Caribbean examples including photographs, graphics and recipes were used to illustrate theories and concepts. This feature

Dr Didacus Jules, Registrar of **CXC** *presenting copies of the texts to Honourable Ronald Jones, Minister of Education and Human Resource Development in Barbados. Ms Wendy Remmington of Nelson Thornes looks on.*

"The difficulty of any text must therefore be seen to vary for individual students, depending, not only on the skills they possess, but also their understanding about the cultural context and the situation in which they engage the text,"

was not lost on Ms Wendy Rimmington, International Director of Nelson Thornes. Ms Rimmington, who was visiting the Caribbean for the first time for the launch of the texts, was fascinated by the inclusion of a recipe for cocoa tea in the English text. The publishing executive made the point that this was the first time she was learning of such a recipe and stressed the importance of connection to the audience.

During an event hosted in Antigua on 22 June to launch the publication of the texts in the Organisation of East Caribbean States (OECS), Dr Honourable Jacqui Quinn-Leandro, Minister of Education, Sports, Youth and Gender Affairs in Antigua and Barbuda applauded and commended the text. "These resources will help our teachers to better administer both the Mathematics and English subjects and thus prepare them for the examination as well as for life," Dr Quinn-Leandro stated.

The Minister also noted that the **CCSLC** programme represents the base qualification for all secondary school leavers. In addition, she observed that "We would have failed in our efforts in the Ministries of Education across the region if we are not focused on preparing our populations to meet and face new opportunities in the face of globalization and regionalization."

Minister Quinn-Leandro also explained that it is in this context that the launch of the texts to support the **CCSLC** programme becomes important to the education system in the region.

The **CCSLC** programme places particular emphasis on increasing the number of school leavers, who have the appropriate knowledge, skills and competencies to successfully enter the job market or to establish some form of economic enterprise.

The Minister, however, sounded a note of caution as the region transitions to Universal Secondary Education. "As Universal Secondary Education becomes au courant; worldwide there is a growing trend of moving more quickly to get children into school as opposed to improving the quality of the education offered."

Dr Quinn-Leandro stated that the region must embrace USE without falling into that trap and accepting sub-optimal or mediocre education.

THE TEXTS

There are four texts, two Mathematics and two English. The Book 1 of the English text covers Modules 1 – 3 and the Book 2 which covers Modules 4 and 5.

Book 1 of the Mathematics text covers Modules 1 – 3 and Book 2 covers Modules 4 and 5.

The texts mimic the **CCSLC** syllabuses in all cases and are highly illustrated with images/ photographs, cartoons, drawings, newspaper clippings, charts, graphs and shapes.

A deliberate effort was made to represent the rich ethnic diversity of the region throughout the texts.

The interactivity of the texts is further enhanced by an accompanying CD Rom which comes with each text.

Very much like the **CCSLC** syllabuses, the texts are replete with examples, solutions to problems, exercises and closing activities for each topic.

Ms Wendy Remmington of Nelson Thornes presenting copies of the texts to Mr Horace Persaud, Local Registrar in the Ministry of Education, Grenada. Glenroy Cumberbatch, Pro Registrar of **CXC** *looks on.*

CARIBBEAN ARTISTIC CONNECTION

CSEC® *Visual Arts Exhibition*

By Cleveland Sam

The historic House of Culture (formerly Government House), graced with elegant palm trees along Belize City's expansive water front, was the venue for this year's **CXC CSEC** Visual Arts Exhibition.

"It is with pride and joy that I declare open this **CSEC** Visual Arts Exhibition." With those words, the exhibition was officially opened on Monday 11th April by Honourable Patrick Faber, Minister of Education and Youth on the grounds of the House of Culture. It was witnessed by 200 guests.

Minister Faber then joined His Excellency Sir Colville Young, Governor General of Belize and former **CSEC** Panel Member and David Leacock, Chief Executive Officer in the Ministry of Education in cutting the ribbon to open the exhibition to the public.

> "When we think of all the abilities required to produce a work of art, when we think of all the abilities that art develops, who can question or deny the place it should have in our curriculum…the place it should have in our schools,"

This student takes on the challenge of drawing one of the pieces on exhibits

Caribbean Artistic Connection

ART CONNECTION

In his delivery of the feature address at the opening ceremony, Honourable Patrick Faber expressed happiness and pride that Belize was selected as the host for the 2011 **CSEC** Visual Arts Exhibition, and recognised it an opportunity for Belize to connect with its Caribbean family.

"What better way to get to know our Caribbean brothers and sisters than through their self-expression, through art," the Minister quipped. "We get to see what interests and concerns them and how they view the world, and my guess is that we may find some strong similarities with our own interests, concerns and views."

These views were also expressed by Kirkland Smith, Visual Arts teacher at the St John's College and chairman of the opening ceremony. "As part of the Caribbean Community, Belize shares the experiences as every Caribbean country regarding the Arts," Mr Smith said. He noted that not only does Belize share artistic connections with the wider Caribbean, but some of the attitudes, views and approaches to the Arts in Belize, are also reflected throughout the Caribbean.

An Artist in his own right, the school teacher said that while the exhibition gave Belizeans a glimpse of the quality of artworks produced by other Caribbean and Belizean students, more importantly, "it also emphasized the bond with the other Caribbean countries and the oneness we share as Caribbean."

ARTS' PLACE IN CURRICULUM

Currently, some schools in Belize, as in other Caribbean states, do not offer **CSEC** Visual Arts in their curriculum. Minister Faber has promised that in Belize this will change soon.

"How many of our students have the opportunity to pursue art as a subject at the high school level much less at the primary school level? The Minister questioned. He posited that this reflects a strong academic bias in the curriculum and schools. "This is a bias that we must change… this is a bias that we intend to change," he stated emphatically.

Minister Faber expressed the view that all secondary school students should benefit from a standard curriculum that includes a core with options. The options he said should afford students the opportunity to explore and develop their abilities and talents in various fields, including technical and vocational options and the performing arts and well as the visual arts.

"When we think of all the abilities required to produce a work of art, when we think of all the abilities that art develops, who can question or deny the place it should have in our curriculum…the place it should have in our schools," he questioned as he outlined a case for Arts-inclusive education.

Students viewing the 3-Dimensional section of the exhibition

Mr Kirkland Smith, Visual Arts teacher has the attention of Honourable Patrick Faber, Mr David Leacock, and His Excellency Sir Colville Young, as he explains the finer points of the art on display

Belize, according to Minister Faber has embraced the UNESCO Pillars of Learning and education in the arts is consistent with the pillars which have adopted and called 'spheres' of learning in Belize. In addition, he said the vision of the Ideal Caribbean person speaks to the demonstration of multiple literacies, including artistic ones.

"It is our expectation that as we begin the process of reforming the secondary school curriculum that art education will be an option available to our students," he said.

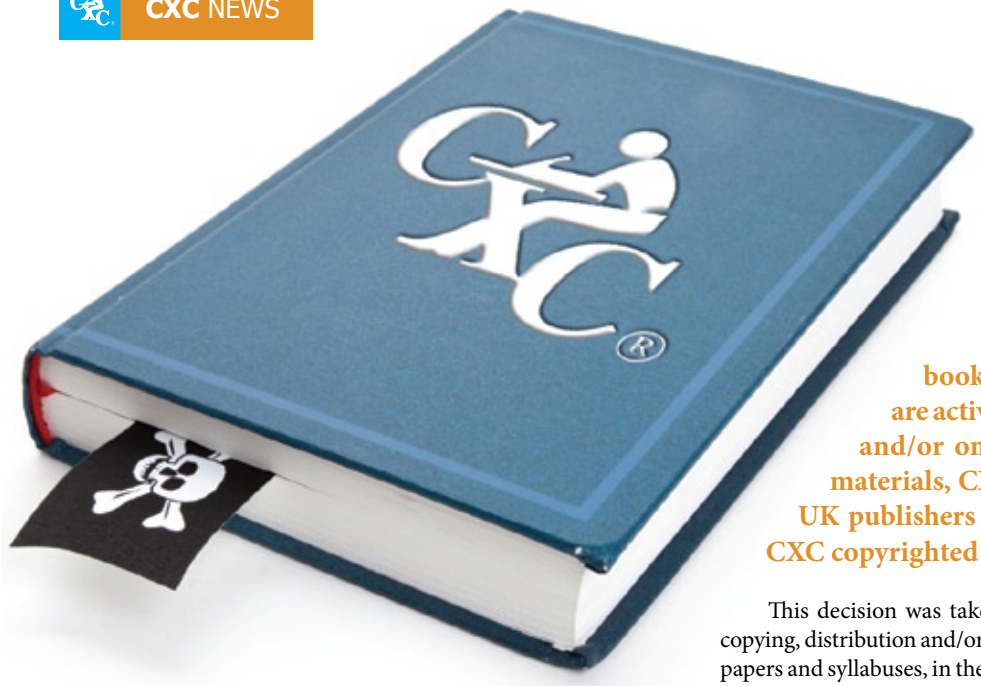
Following the opening ceremony and the cutting of the ribbon, the official party toured the exhibition under the guidance of Kirland Smith.

The exhibition ran from Monday 11th to Friday 15th April. It featured pieces from all 10 Options of the Visual Arts syllabus and occupied both floors of the Governor's Manson. The works of several previous Regional Top Award winners for 2-Dimensional and 3-Dimensional Art, including that of Belizean Jia Wu were on display.

FROM THE GUEST BOOK

The following were some of the comments which were written in the guest book at the exhibition: *"Amazing", "great level of creativity", "impressive work", "very good display", "breath-taking", "impressive collection of work from such young artists", "seems like I was in another world, just unbelievable", "I so love it here, excellent exhibition", "it took my breath away", "wow, just wow!"*

CXC NEWS



CXC® and Publishers take unified stance against PIRACY

Against the backdrop that illegitimate booksellers and individuals in some territories are actively engaged in the large-scale reproduction and/or online provision of published educational materials, CXC® is teaming up with the Caribbean and UK publishers associations in the fight against piracy of CXC copyrighted material and textbooks in the Caribbean.

This decision was taken in an effort to halt the widespread, unauthorized copying, distribution and/or sale of materials produced by **CXC**, including question papers and syllabuses, in their entirety or extracts thereof. This illegal action comes at a considerable cost to **CXC** as it strives to further assist candidates preparing for its examinations through the production of resource materials as well as to publishers and legitimate booksellers. By presenting a unified front, **CXC** and publishers will help send the message that copyright infringement cannot be accepted as the status quo.

Except in cases where permission has been sought from, and granted by, **CXC** or the respective publishing house, no person or entity is authorized to make, sell or distribute reprographic copies (including photocopies) or electronic copies of **CXC** publications, syllabuses and/or past papers, or textbooks published by the Caribbean and/or UK publishers. All such copies constitute infringing copies under copyright law for which several penalties for such violations, including injunctive relief and punitive damages, are provided.

CXC will be working with the Caribbean and UK publishers to monitor the situation and legal recourse will be sought as necessary. To avoid legal action, all persons who are currently engaged in the unauthorized copying, sale and/or distribution (including electronically via the Internet) of infringing copies must cease such activity immediately or face legal action.

Ministries of Education in the territories in which the illegal mass production of textbooks is being observed have been contacted and have been requested to intervene to ensure that all procurement of textbooks, whether through the Ministry of Education or government schools, be done through the official agents of the Caribbean and UK publishers.

Booksellers and members of the public are urged to respect the intellectual property rights of **CXC** and publishers, and to assist in the efforts to curb this illegal practice by reporting any unauthorized copying, sale and/or distribution of infringing copyrighted material to **CXC** via e-mail at **ip-info@cxc.org** or **cxcezo@cxc.org**

CXC, along with the publishers in the Caribbean and the UK, remain committed to providing the highest quality educational material and thanks the public for its continuing support.

*"This illegal action comes at a considerable cost to **CXC** as it strives to further assist candidates preparing for its examinations through the production of resource materials as well as to publishers and legitimate booksellers."*

CXC® ONLINE RESULTS

Candidates who wrote the Caribbean Examinations Council's (**CXC**) May/June 2011 examinations were able to access their results online.

This is the first time this facility was made available to candidates; however, **CXC** has been issuing the results to Participating Territories via its Online Registration System (ORS) for the past three years.

"This functionality has taken full account of the issues raised by principals about the need to ensure that students are in full compliance with school regulations and have fulfilled their obligations prior to receipt of results," explained Mrs Susan Giles, Senior Assistant Registrar for Examinations Administration and Security at **CXC**.

Mrs Giles added that "at the same time, it meets the Council's objective of delivering results by the most reliable and expeditious method and in the shortest possible time."

To access their results, candidates were required to enter their 10-digit registration number, last name and date of birth.

In addition to candidates' results, broadsheets, centre statistics and Merit Lists for schools were also available to principals via the Online Registration System (ORS).

Dr Didacus Jules, **CXC** Registrar, lauded this development and said this is all in keeping with the strategic vision of making **CXC** an IT-intelligent organization which leverages ICT for the benefits of its stakeholders.

SMALL NUMBER OF STUDENTS TAKING FOREIGN LANGUAGES – A CONCERN FOR CXC®

The small and decrease in the number of candidates entering for French and Spanish at the Caribbean Advanced Proficiency Examination (**CAPE**) is a cause for concern to the Caribbean Examinations Council (**CXC**).

For the May/June 2011 sitting, 249 candidates entered for French Unit 1, compared with 302 candidates in 2010, while 221 entered for French Unit 2 this year compared with 215 last year.

The numbers for Spanish were higher but relatively small when compared with other subjects. Seven hundred and thirty-nine candidates entered for Spanish Unit 1 this year compared with 820 last year, while 555 candidates entered for Spanish Unit 2, compared with 553 last year.

Professor E Nigel Harris, Chairman of **CXC** expressed his concern about the small number of Foreign Language candidates during the Final Awards Committee meeting held on 6th August in Barbados. Professor Harris stated that in an increasingly globalised world, and in a region where so many different languages are spoken, students need to equip themselves with at least one foreign language.

While the entries are small in the foreign languages, performance continues to be stable and impressive. For French Unit 1, 97 per cent of the entries achieved Grades I – V, the same as in 2010. Twenty-two per cent of the candidates achieved Grade I. Similarly in French Unit 2, 96 per cent of candidates achieved Grades I–V compared with 97 per cent last year. Twenty per cent of the candidates achieved Grade I and 27 per cent achieved Grade II.

OVERALL PERFORMANCE

For the fourth consecutive year, overall performance at **CAPE** remained steady at 89 per cent of Unit entries achieving acceptable grades; these are Grades I–V on the seven-point grading scale for **CAPE**.

Performance declined on 21 Units, improved on 18 Units and remained the same on five Units.

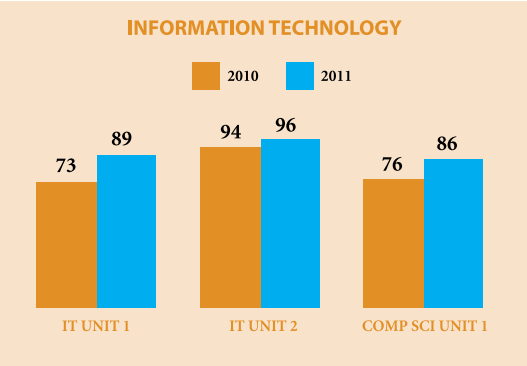
The subject with the most significant improvement in performance was Electrical and Electronic Technology. This year 80 per cent of the entries for Unit 2 achieved Grades I –V compared with 51 per cent last year. In Unit 1, there was a 24 per cent improvement with 66 per cent of entries achieving Grades I –V compared with 42 per cent in 2010.

TECHNOLOGY

Both technology subjects, Computer Science and Information Technology were among the Units with improved performance. Information Technology Unit 1 registered one of the largest percentage increases in performance. This year, 89 per cent of entries achieved Grades I – V compared with 73 per cent in 2010. Ninety-six per cent of entries for Information Technology Unit 2 achieved Grades I – V, two per cent more than the 94 in 2010.

The Examining Committee attributed the improved performance in Unit 1 primarily to candidates' improved performance on Paper 02, which is the extended response Paper.

Computer Science Unit 1 registered a 10 per cent improvement with 86 per cent of entries achieving Grades I – V compared with 76 per cent achieving similar grades in 2010.

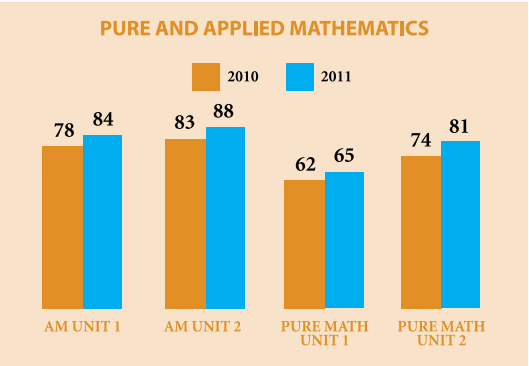


Questions which required candidates to read, understand and develop programs to solve problems were not answered adequately.

The Examining Committee has recommended that candidates develop skills in analysis, writing, and testing computer programs from real-world scenarios.

MATHEMATICS

All four Units of Mathematics registered improved performance when compared with 2010. Eighty-four per cent of entries for Applied Mathematics Unit 1 achieved Grades I –V compared with 78 per cent last year. There was also significant improvement in the number of candidates achieving at the higher level; 25 per cent of the entries achieved Grade I and 13 per cent achieved Grade II.



In Unit 2, this year 88 per cent of entries achieved Grades I – V compared with 83 per cent in 2010.

The overall improvement in performance was due to better performance on five of the six modules in both Units. Only Module 1 (Collecting and Describing Data) in Unit I showed a slight decline in performance this year. Module 2 (Probability and Distribution) in Unit 2 saw the most significant improvement in performance over last year.

For Pure Mathematics Unit 1, 65 per cent of entries achieved Grades I – V compared with 62 per cent in 2010. In Unit 2, performance also improved by six per cent with 81 per cent of entries achieving acceptable grades compared with 74 per cent in 2010.

The Examining Committee reported evidence of outstanding performance in certain items on Paper 01; however, similar concepts on Paper 02 were not adequately answered. Many of the Paper 02 scripts revealed many instances where the candidates appeared unsure of the most appropriate strategies for solving specific problems. This was most evident among candidates especially in the Grade III/IV and Grade IV/V bands.

NATURAL SCIENCES

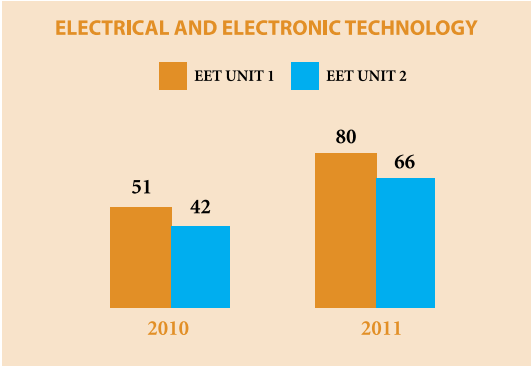
Of the three Natural Sciences, Biology Unit 2 and Physics Unit 1 were the Units which showed improved performance. Biology Unit 2 saw a slight increase in acceptable grades, some 95 per cent of the entries for Biology Unit 1 achieved Grades I – V compared with 94 per cent in 2010. What was significant about the performance is that the majority of candidates achieved at the higher Grades- 26 per cent achieved Grade I, 27 per cent Grade II and 21 per cent Grade III.

Physics Unit 1 also had a slight improvement this year with 93 per cent of entries achieving Grades

I – V. Thirty-six per cent of the entries achieved Grades Is and IIs.

The First Law of Thermodynamics was cited by the Examining Committee as an area which continues to cause candidates great difficulty in Physics Unit 1.

For Physics Unit 2, candidates were challenged in responding to the questions dealing with the release of energy by nuclear fission or perform calculations accurately of energy released by different fuels.



According to the Examining Committee, the lack of certain skills led to the overall decline in performance in Unit 1. Among the skills highlighted were drawing, planning of diagram of specific region on a photomicrograph and applying knowledge of the components of a biological system to a schematic representation of that system.

Both Units of Chemistry registered a slight decline in performance when compared with 2010. Eighty-one per cent of entries achieved acceptable grades in Unit 1 this year down from 85 per cent last year, while in Unit 2; it fell from 92 per cent last year to 90 per cent this year.

The decline was attributed to a general decline in performance on Paper 02 in both Units, particularly in Unit 1. Across all grade levels, the Examining Committed reported weak responses to questions testing experimental skills. Candidates tended to perform better when stimulus materials such as diagrams were provided, but experienced difficulty when descriptive answers were required.

BUSINESS UNITS

There were mixed performances in the Business cluster Units, with improved performance in both Units of Management of Business. Eighty-eight per cent of entries in Unit 1 achieved acceptable grades compared with 83 per cent in 2010, while in Unit 2, 97 per cent achieved similar grades compared with and 95 per cent last year.

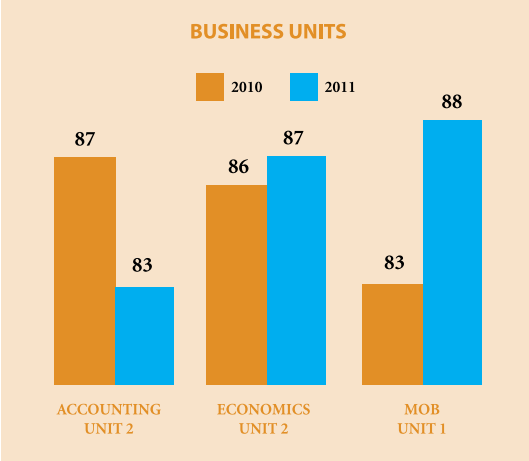
Accounting Unit 1 remained relatively steady with 95 per cent and 96 per cent achieving Grades I –V in 2011 and 2010 respectively. Accounting Unit 2 saw a decline from 87 per cent of acceptable grades in 2010 to 83 per cent this year.

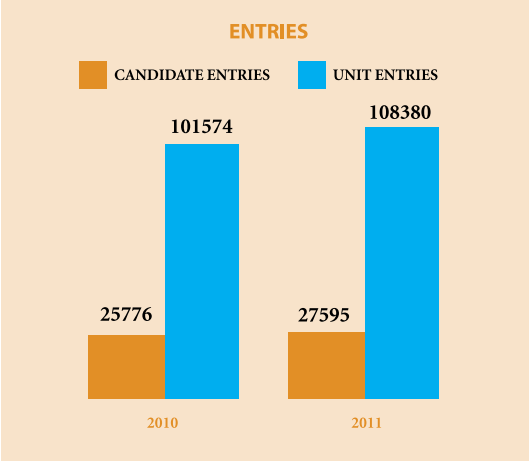
Performance on Economics Unit 2 improved slightly to 87 per cent this year compared with 86 per cent in 2010, while for Economics Unit 1performance remained steady with 86 per cent of acceptable grades in both years.

CAPE GROWTH

There was a five per cent increase in candidate entries when compared with 2010. This year 27, 595 candidates registered for **CAPE** compared with just over 25,000 last year.

Communication Studies continues to be the largest subject at **CAPE** and this year grew by nine per cent to 15,069 candidates. Caribbean Studies, the other single Unit course at **CAPE** was second with 10, 881, followed by Physics Unit 1 with 5867 candidates, Sociology Unit 1 with 5691 and management of Business Unit 1 with 5575 candidates round off the top five largest Unit entries.





PERFORMANCE IN CSEC® ENGLISH CONTINUES TO IMPROVE

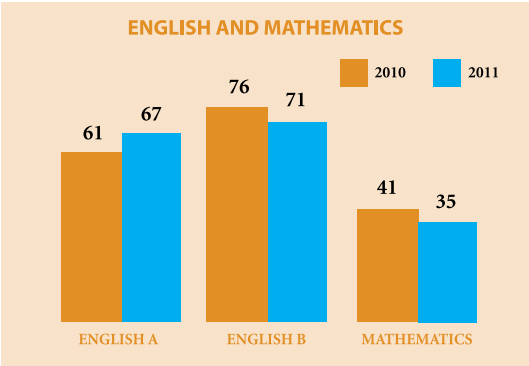
Following the trend of the last two years, performance on English A continues to improve. This year 67 per cent of the entries achieved Grades I – III compared with 61 per cent last year and 56 per cent in 2009. Eighteen per cent of the entries achieved Grade I and 21 per cent achieved Grade II.

The English A Examining Committee attributed the overall improved performance to a moderate improvement on candidates' performance on Profile 1 (Understanding) and Profile 2 (Expression).

Performance on English B was again very satisfactory this year even though there was a six per cent decline, from 76 per cent last year to 71 per cent this year. The majority of the entries achieved grades at the higher end, with 25 per cent achieving Grade I and 31 per cent achieving Grade II.

The slight decline was attributed to weaker than expected performance on the Poetry Profile.

During the Final Awards Committee meeting held on 6th August, the Council expressed concern about the relatively small number of candidates pursuing English B when compared with English A. This year close to 100, 000 candidates registered for English A, while approximately 20, 000 registered for English B.



MATHEMATICS

While performance in English is improving, performance in Mathematics continues to decline. This year 35 per cent of entries achieved acceptable grades, compared with 41 per cent in 2010 and 40 per cent in 2009.

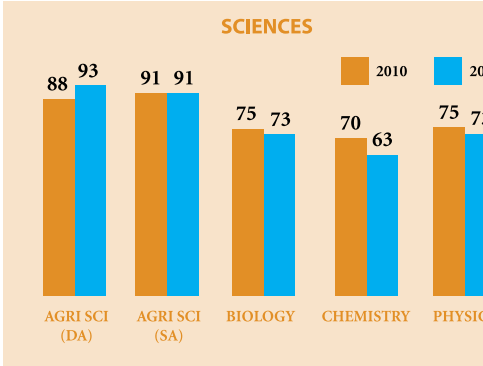
The Examining Committee reported that candidates performed poorly on Paper 02, indicating that a large proportion of candidates were not adequately prepared for Section II of the Paper, which included questions from the core objectives of the syllabus as well as optional questions. The Committee also revealed that 25 per cent of candidates did not attempt the required number of questions on section II. In addition, less than 50 per cent of candidates attempted the optional questions.

SCIENCES

The sciences produced mixed results with performance on the science subjects, including the three Natural Sciences declining but improving on Agricultural Science (Double Award) and remaining steady on Agricultural Science (Single Award). For Agricultural Science (DA), 93 per cent of the entries achieved acceptable grades compared with 88 per cent in 2010. In Agricultural Science (SA), performance remained the same for 2011 and 2010 with 91 per cent of entries achieving Grades I – III.

Both Biology and Physics saw the same performance in the two years, 73 per cent of entries achieving Grades I – III this year down slightly from the 75 per cent which achieved similar grades last year.

For Physics candidates performed very well at the higher grades with 20 per cent of candidates achieving



Grade I and 23 per cent achieving Grade II. The Examining Committee reported weak performance on questions which required mathematical calculations. The pattern was similar in Biology. Sixteen per cent of entries achieved Grade I and 24 per cent achieved Grade II.

Performance in Chemistry declined by seven per cent; from 70 per cent of entries achieving acceptable grades in 2010 to 63 per cent this year. Organic Chemistry was again cited as an area of weak performance along with the Chemistry Involved in Cooking and qualitative analysis.

The Examining Committee noted that the topics were not difficult; however, the performance reflected an uncommitted approach to the delivery of the topics, in that Organic Chemistry is left until late in the term, while Chemistry Involved in Cooking is done in the form of assignments outside the classroom setting.

The Examining Committee has recommended that "Organic Chemistry component be introduced earlier in the programme and delivered at a more comfortable pace." This, the committee thinks will give candidates more time to appreciate and assimilate the material.

Performance in Human and Social Biology declined by five per cent this year, with 63 per cent of entries achieving acceptable grades compared with 68 per cent last year. Although there was an overall decline, performance at the higher grade bands improved; 18 per cent of entries achieved Grade I and 23 per cent achieved Grade II.

Integrated Science saw a 12 per cent decline in performance over last year. This year 73 per cent of entries achieved Grades I – III compared with 85 per cent last year.

BEST PERFORMANCE

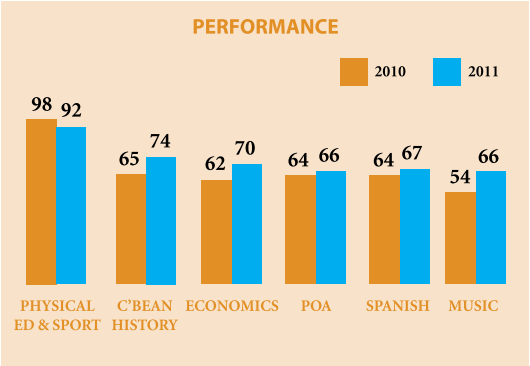
Physical Education and Sports was the subject with the best overall performance with 97 per cent of the entries achieving acceptable grades. Forty per cent of the entries achieved Grade I, while 38 per cent achieved Grade II and 18 per cent achieved Grade III. The performance is consistent with that of 2010 when 98 per cent of entries achieved Grades I – III.

Food and Nutrition also maintained a high standard of performance with 92 per cent; Home Economics Management 89 per cent; Office Administration 88 per cent; Religious Education and Theatre Arts 87 per cent and Building Technology (Construction) 83 per cent achieving acceptable grades.

PERFORMANCE

Overall performance declined slightly this year with 66 per cent of the entries achieving Grades I –III, which are the acceptable grades at **CSEC**. Last year 69 per cent of the entries achieved similar grades.

Among the subjects with improved performance this year were Caribbean History up 74 per cent compared with 65 per cent last year; Economics, up 70 per cent compared with 62 per cent last year; Music and Principles of Accounts both at 66 per cent this year compared with 53 per cent and 64 per cent last year respectively; and Spanish up 67 per cent



CSEC® RESULTS

compared with 64 per cent last year.

The Caribbean History Examining Committee noted that in spite of the improved performance over the last three years, there is still work to be done in the classroom. Among the weaknesses pointed out was the fact that some candidates did not manage the extended essay question adequately. In a number of cases the candidates dealt mainly with the theme of the question and but not the objective of the question. The Committee also pointed out that there was "a serious vocabulary deficiency" and this affected the candidates' ability to manipulate certain key words and grasp the demands of the questions.

ENTRIES

This year candidate entries for the Caribbean Secondary Education Certificate (**CSEC**) examination declined marginally when compared with last year. The total number of candidates registered this year stood at 153,120 compared to 153,447 candidates in 2010.

In spite of the slight decline in candidate entries, subject entries increased. The number of subject entries submitted this year passed the 610,000 mark. Six hundred and ten thousand, seven hundred and thirteen subject entries were submitted this year, compared with 606,034 in 2010.

Several subjects registered significant increases in registration over last year, including all three Natural Sciences, Electronic Document Preparation and Management, Human and Social Biology, Information Technology, Mathematics and Physical Education and Sports.

Human and Social Biology registered the largest increase of candidates, with entries moving from 31,546 in 2010 to 33,386 this year, an increase of 1840. Physical Education and Sports jumped from 5,636 candidates in 2010 to 7,040 this year, an increase of 1404. Entries for Chemistry increased from

13,542 last year to 14,791 this year, up by 1249, while for Mathematics, entries increased from 100,084 in 2010 to 101, 245 this year, up by 1161. Entries for Biology increased by 828, moving from 15,290 last year to 16,118 this year.

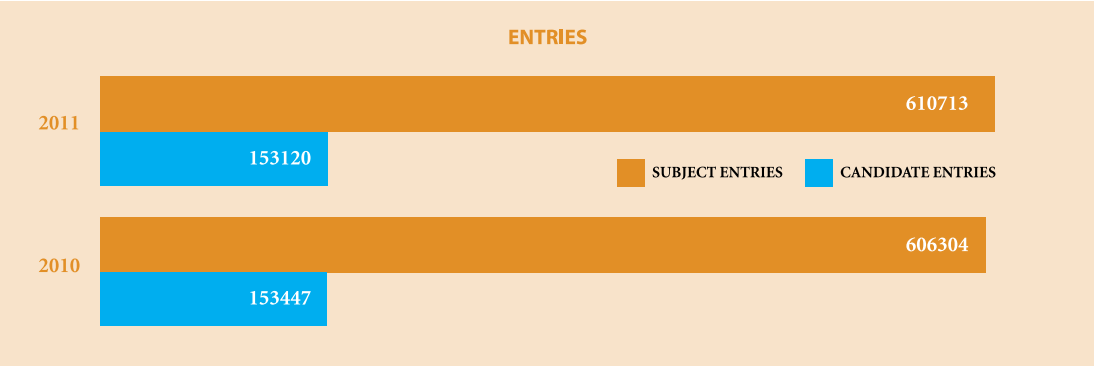
For the first time, more candidates registered for Mathematics than English A. This year 100,084 candidates registered for Mathematics compared with 98,708 candidates for English A. Traditionally, English A has been the subject with the largest entries.

Social Studies maintained the third spot with 53,426 candidates; followed by Principles of Business with 38,021 and Human and Social Biology with 33, 386 candidates.

ADULT POPULATION

The age group 19 years and over accounted for the largest percentage of candidates registering for the **CSEC** examinations. This year, 31 per cent or 57,413 of the candidates were in that age group.

"This age group represents the adult population in the region, therefore, this statistic demonstrates that adults are still accessing our examinations and see them as relevant for their upward mobility in the work place or for accessing tertiary education."



CXC NEWS

MASTERING CCSLC®: *performance continues to improve*

For the third consecutive year, performance in the Caribbean Certificate of Secondary Level Competence (**CCSLC**) continues to trend upwards. This year, overall performance reached its highest level since the programme was introduced in 2007.

Just over 70 per cent of the entries achieved acceptable grades – Mastery and Competent. This compares with 63 per cent last year and 54 per cent in 2009. Sixteen and half per cent of the entries achieved Mastery, the highest grade at **CCSLC**, while 54.30 per cent achieved Competent. Last year, 11.33 per cent of entries achieved Mastery and 52 per cent achieved Competence.

Four of the five **CCSLC** subjects recorded improved performance. Performance in French declined, following last year's trend.

English recorded the best overall performance with 78 per cent of the entries achieving acceptable grades. Of that percentage, 27.84 per cent achieved Mastery and 50.72 per cent achieved Competent.

Seventy-three per cent of entries for Social Studies achieved acceptable grades, compared to 64 per cent in 2010. Just over 13 per cent achieved Mastery and 60 per cent achieved Competent.

For Spanish, 15.50 per cent of entries achieved Mastery and 56.15 per cent achieved Competent for a 71.65 per cent rate of acceptable grades. This was a five per cent improvement over 2010 when 66 per cent achieved similar grades.

Mathematics recorded an 11 per cent improvement in performance over 2010. Sixty-four per cent of entries achieved acceptable grades, compared with 53 per cent last year. Eleven per cent of entries achieved Mastery, while 53 per cent achieved Competent.

There was a slight improvement in performance in Integrated Science, with 67 per cent achieving acceptable grades, one per cent more than in 2010.

DECLINE IN ENTRIES

The number of candidates writing the **CCSLC** declined slightly this year. Nineteen thousand, six hundred and seventy-eight candidates took the **CCSLC** this year, compared to 20,354 in 2010. This also affected the number of subject entries. This year 49,063 subject entries were submitted compared to 63,697 in 2010.

Entries are expected to see a major increase next year as Barbados comes on board with the programme in its secondary schools from September 2011.

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BIOLOGY
Agronomist, Biologist, Consultant, Pathologist Microbiologist, Wildlife Biologist, Fisheries Biologist

CHEMISTRY
Chemist, Waterworks Laboratory Technician, Science Teacher, Analysis & Quality Control Technician, Pharmaceutical Rep.

COMPUTER SCIENCE
Computer Programmer, System Analyst, Software Engineer, Information Technology

ECONOMICS
Economist, Business Analyst

EDUCATION
Teacher, Principal, School Supervisor

ENGLISH
Teacher, Journalist, Writer, Editor, Educator, Public Relations

FINE ARTS
Artist, Film Maker, Writer, Critic, Film Director, Teacher

FOREIGN LANGUAGES (FRENCH & SPANISH)
Teacher, Translator, Ministerial Diplomat

HOTEL MANAGEMENT
Hospitality Manager, Hotel Manager, Catering Manager

LABOUR & EMPLOYMENT
Arbitrator, Conciliator, Mediator, Compensations Manager, Employment & Recruitment Specialist, Training & Development Specialist

LAW
Lawyer, Solicitor, Barrister, Ministerial Diplomat, Consultant

MANAGEMENT STUDIES
Consultant, Entrepreneur/Small Business Owner, Human Resource Manager, Finance Manager, Marketing Manager

MATHEMATICS
Actuary, Statistician, Business Analyst

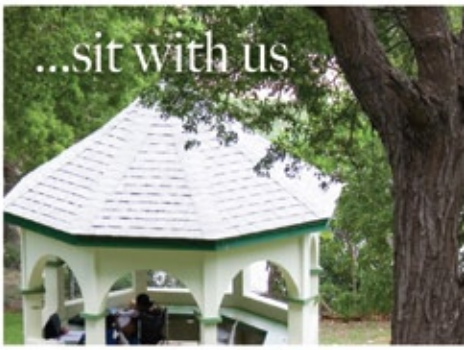
MEDICINE & SURGERY
Doctor, Physician, General Practitioner, Surgeon, Specialist, Consultant

PHYSICS
Science Teacher, Physicist, Lab. Technician

POLITICAL SCIENCE
Government Consultancy, Diplomatic Service, Politician

PSYCHOLOGY
Psychologist

SOCIAL WORK
Social Worker



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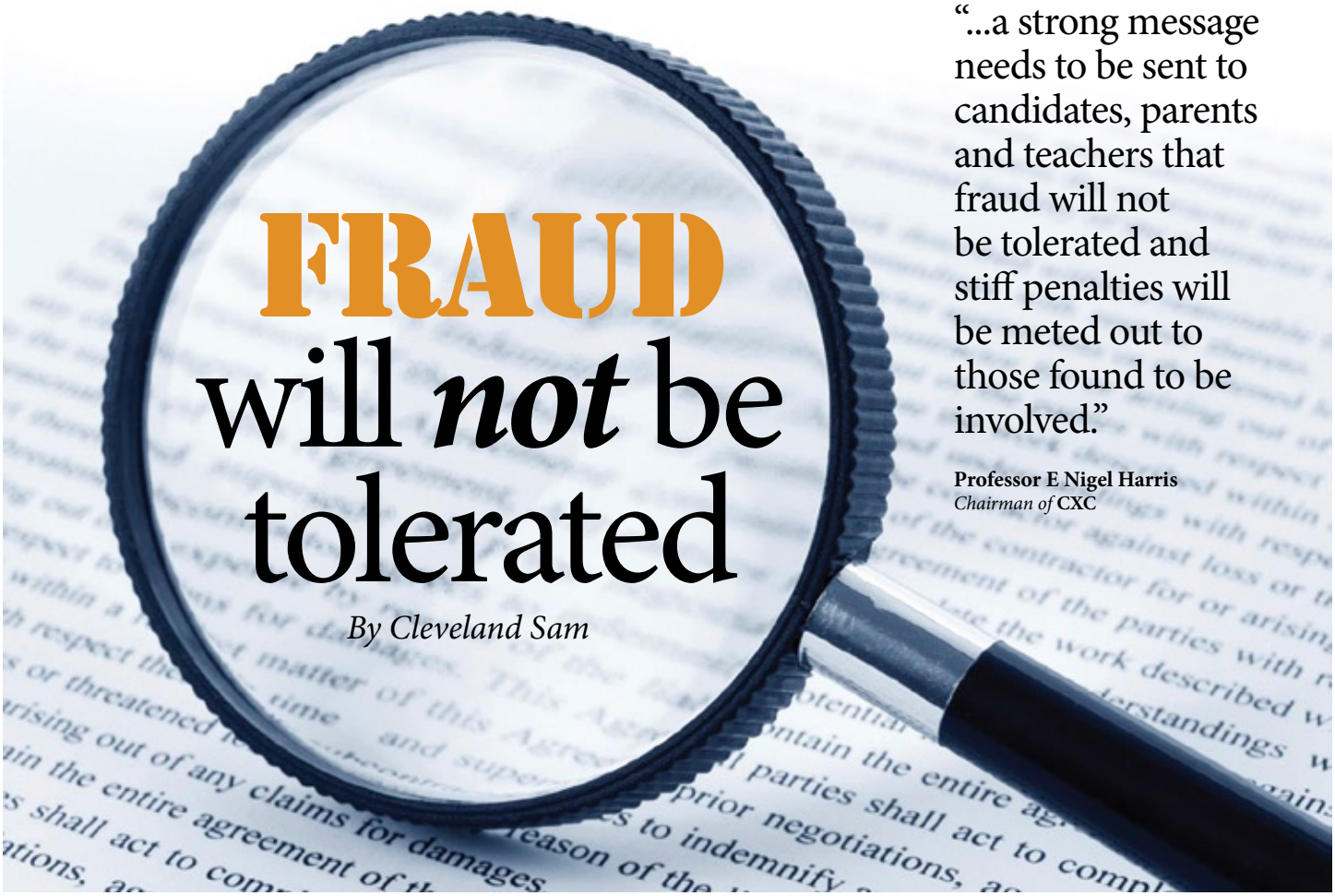
CXC NEWS



FRAUD will *not* be tolerated

By Cleveland Sam

"...a strong message needs to be sent to candidates, parents and teachers that fraud will not be tolerated and stiff penalties will be meted out to those found to be involved."

Professor E Nigel Harris
Chairman of **CXC**

Candidates writing examinations offered by the Caribbean Examinations Council (**CXC**) could have their results cancelled, be disqualified from all examinations taken and debarred from future examinations if it is found that they were involved in fraudulent activities.

This point has been reiterated by Professor E. Nigel Harris, Chairman of **CXC**. Speaking on Friday 5th August during the meeting of the Final Awards Committee for the May/June 2011 examinations, Professor Harris stated emphatically that "fraud will not be tolerated by **CXC**!"

Professor Harris was speaking after it was reported that there were 245 cases of irregularities in the May/June sitting, several of them involving acts of fraud.

While noting that the number of cases of fraud in **CXC** examinations is relatively small compared to the number of candidates who write the examinations, Professor Harris said a strong message needs to be sent to candidates, parents and teachers that fraud will not be tolerated and stiff penalties will be meted out to those found to be involved.

The reported cases of fraud in the 2011 examinations included collusion in the examination room, collusion on school based assessment (SBA), impersonation, forged signature, taking notes into the examination room, submission of identical practical reports, submission of fabricated SBA marks, and submission of SBA projects previously submitted by past students.

The Council's Regulations 9.1.1 – 9.1.6 deal with all aspects of misconduct during examination. The regulation states: "If the Final Awards Committee finds the candidate guilty of misconduct, it may direct the Registrar to warn or censure the candidate, cancel the result in the subject, disqualify the candidate from sitting of the examination or disqualify and/or debar the candidate for specified period from registering for examinations administered by the Council."

Further, "the Council may, on the advice of the Final Awards Committee, request the Ministry of Education in the relevant territory to take legal action in accordance with Integrity Legislation enacted in the territory for the Protection of the Council's examinations, if the evidence indicated that criminal activity prejudicial to the good conduct of the examinations has occurred."

The Council's regulations stipulate three different penalties for various breaches of the misconduct guidelines. They are cancellation of the results for a single subject in which the misconduct occurred, disqualification from all examinations during that sitting and disqualification and debarment from writing any examination offered by the Council for a specific period of time.

CXC NEWS

CXC® goes E-Commerce

The Caribbean Examinations Council (**CXC**) is pleased to announce that its website www.**cxc**.org now offers electronic commerce functionalities commonly known as e-commerce.

Candidates now have the option of paying for Transcript Requests online when they complete the Transcript Request Form, one of the most utilized services on the **CXC** website.

To access the service, candidates are required to enter their information at the time of the examination, including personal data, examination details and the forwarding recipients for the transcript. Candidates may then choose the processing and delivery times to suit their request. To complete the transaction, candidates will also need to choose a payment method using a Visa or Master card credit card.

In the past, candidates printed and completed the Transcript Request Form in hard copy and mailed or faxed it to **CXC** along with a bank draft. This process took between three days and two weeks to reach **CXC** and delayed the processing of the transcript request.

"With the use of e-commerce, **CXC** has been able to make the processing of Transcript Requests more efficient and therefore provides a vastly improved service to its clients," Dr Didacus Jules, **CXC** Registrar. "Transcript Request is one of the most important value-added services **CXC** offers to candidates and it is vital that we make the process as smooth and efficient as possible."

Dr Jules added that as **CXC** is transformed into an IT-Intelligent Organisation, its clients can expect enhanced services through the leveraging of web-based technology.

The next phase of the e-commerce roll-out will include offering online payments for replacement certificates, website advertising, queries and reviews.

*"With the use of e-commerce, **CXC** has been able to make the processing of Transcript Requests more efficient and therefore provides a vastly improved service to its clients"*

CXC NEWS

CXC® STAFF *"Highly Commended"* IN COMMONWEALTH SHORT STORY CONTEST

Mrs Edwina Griffith, Administrative Assistant in the Examinations Administration and Security Division at **CXC** loves writing. At almost every staff event, *'Eddie'* as she is affectionately called writes a poem and reads the poem. These are generally of a hilarious nature.

Eddie's talent, however, goes beyond poetry. In late February of 2011 she received an e-mail advertising a short story competition with an early March deadline; she took up the challenge. It was the Commonwealth Short Story Competition.

She wrote and submitted a story entitled '*White Shoes*'.

On 15th September, Edwina received news that her story was one of three from the Caribbean region to receive a *"Highly Commended"* citation and was part of the competition's two-CD compilation. ***Congrats Edwina and keep writing!***