

## **INSPIRING SCIENCE EDUCATION FOR GIRLS USING ICT TEACHERS' FOLLOW-UP WORKSHOP HELD AT MUKONO DFI (18<sup>TH</sup> -19<sup>TH</sup>) JUNE, 2007**



**Fig 1: Teachers attending the follow-up workshop at Mukono DFI**

### **Introduction**

Five teachers from each of the 11 schools which had attended an Integration of ICT in the teaching of Science teachers workshop held at Gayaza High School (23<sup>rd</sup> -25<sup>th</sup>) May 2007 were invited to this follow-up workshop. The schools included; Gayaza High School, Aggrey Memorial, Wanyange Girls, Bweranyangi Girls School, Dabani Girls School, Ngora Girls, Ngora High School, Nalinya Lwantale Girls School, Muni Girls School, Kyeizoba Girls School and Ediofe Girls School. Mukono Bishop's SS was later invited to the workshop.

The two day follow-up workshop was organized and sponsored by the Ministry of Education and Sports. SchoolNet Uganda conducted the workshop.

### **Workshop Objectives.**

The workshop objectives included:

- School updates: Hearing from the teachers what positive development related to the use of Information Communication Technology (ICT) had taken place at their respective schools since the Gayaza Workshop.

- Sharing experiences and knowledge about what strategies had worked regarding the introduction of ICT in the teaching of sciences.
- Project update: Updating the schools on the progress of the Inspiring Science Education for Girls Using ICT project at national level.
- Introducing teachers to new pedagogical strategies for teaching science; constructivism and Inquiry-based teaching.
- Visiting Kyambogo College School – one of the schools the Ministry of Education has set up as “Centres of Excellence”. Learning by seeing.
- Build teachers’ capacity to advocate for ICT integration in their schools.

### Workshop Programme

Time	Activity	By Whom
Sunday 17 <sup>th</sup> June 2007		
2.00–8.00 PM	Participant Report to the Training Venue	
Monday 18 <sup>th</sup> June 2007		
8.00 -8.30 AM	Registration	Participants
8.00 -8:45 AM	Programme Overview and Workshop Opening remarks	Kakinda Daniel
8:45 -10:40 AM	School Update : Progress reports	Participants
10:40-11:00 AM	HEALTHY BREAK & TEA	
11:00-11:40 AM	Remarks by Ministry of Education and Sports & Official Opening	Mr. Nsumba-Lyazi
11: 40 –12:00	Questions/Answers	
12:00 – 1:00 PM	Project Update : Inspiring Science Education for Girls Using ICT	Kakinda Daniel
1:00 -2:00 PM	LUNCH	
2:00 -3:00 PM	Introduction to Constructivism Pedagogy Minds-on Activity	Kakinda Daniel Participants
3:00 -3:40 PM	Introduction to Inquiry –based Learning	<i>Namusana Hellen, Nyamaganda Olivia and Sebayiga Solomon</i>
3:40-4:00 PM	HEALTHY BREAK & TEA	
4:00 -5-30 PM	Inquiry-based Learning Hands-On Activity	Participants
TUESDAY 19 <sup>th</sup> JUNE 2007		

8:00 AM	Bus Leaves for Kyambogo College School (KCS)	Participants
8:45 -9:20 AM	Overview of the ICT infrastructure at Kyambogo College School	IT Coordinator(KCS)
9:20 -10:20 AM	Watching a live S4 lesson integrating ICT in Physics	
10:20 -10:50 AM	Discussions	
11:40 -1:00 PM	Watching a live S2 lesson integrating ICT in English	
1:00 -1: 20 PM	Discussions	
1:40 PM	Bus leaves for Mukono DFI	Participants
2:00 -3:00 PM	LUNCH	
3:00 – 5:00 PM	Advocating for ICT in Schools	Lawrence Ssenkubuge
5:00 -5:30 PM	Remarks by Ministry of Education and Sports and official closing	Mr. Nsumba-Lyazi
WEDNESDAY 20 <sup>TH</sup> JUNE 2007		
8:00 AM +	Participants Depart for their schools	

## Registration

For list of participants and their contact information see Appendix 1

## Workshop Programme Overview and Opening Remarks.

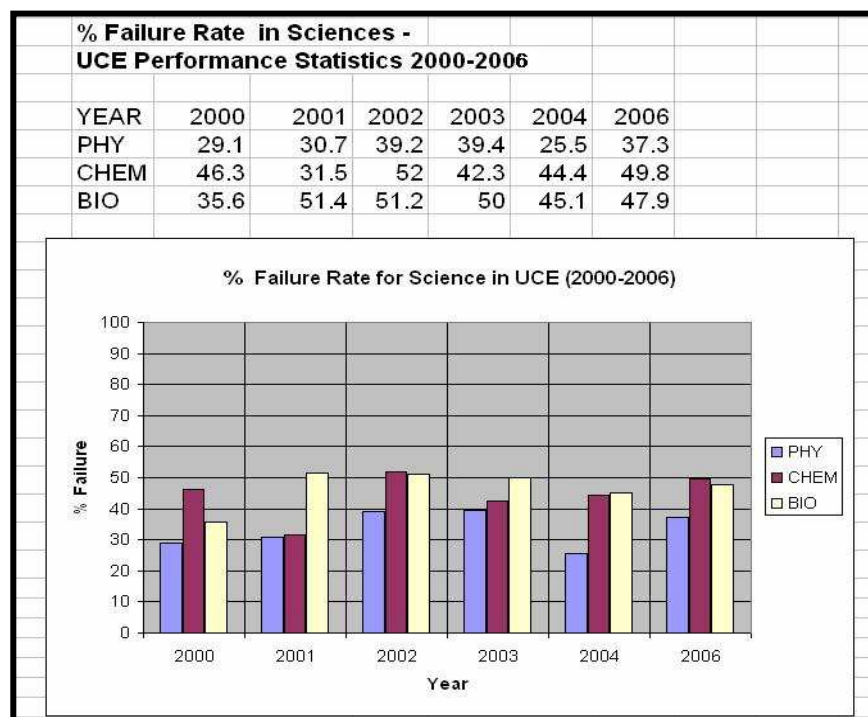
Kakinda Daniel (Executive & Training Director, SchoolNet Uganda) was the lead facilitator of the workshop. He went through the workshop objectives and the workshop programme for the two days.

Kakinda emphasized that this was a follow-up workshop of the *Inspiring Science Education for Girls using ICT* workshop for science teachers which was held at Gayaza High School (23<sup>rd</sup> -25<sup>th</sup>) April 2007. The Ministry of Education and Sports from time-to- time will be organizing follow-up workshops with the aim of:

- Getting school updates on the progress of the project.
- Facilitating peer-learning and sharing of the successful strategies schools are using in the project implementation.

Kakinda told the teachers that when giving school updates, they should only report on the successes and not the challenges and should not push themselves to the edges of their comfort zones.

Participants were shown the percentage failure rates for sciences at Uganda Certificate of Education (UCE) (2000 -2006)



**Fig 2: Percentage failure rate for sciences at UCE (2000-2006)**

Participants were also informed that baseline studies on the state of science and Mathematics teaching in Uganda conducted by Kyambogo University in 2004 & Secondary Science and Mathematics Teaching project (SESEMAT) in 2005 indicated that there were teacher factors, learner factors and administrative factors that contributed to the poor performance in Science and Mathematics.

The teacher factors that contribute to poor performance in sciences included:

- Poor mastery of content, inadequate practical skills and innovativeness.
- Theoretical, teacher-centred approaches.
- Poor planning and preparation. Poor assessment and evaluation of learners' work.
- Poor commitment to the teaching profession.
- Underutilization of the available resources.
- Lack of motivation.
- Negative attitude.
- Inadequate knowledge in preparation of solutions and reagents.
- Use of out dated text materials.

- Poor lesson delivery- dictation of notes without demonstration.
- Inadequate guidance and counselling to the learners

Learner factors that contribute to poor performance in Science & Mathematics:

- Negative attitude towards Science (manifested in: untidy work, absenteeism, low concentration during the lesson and indiscipline).
- Peer and parental influence
- Poor reading, writing and practical skills.

Administrative factors that contribute to poor performance in Science & Mathematics:

- Inadequate support
- Inadequate monitoring and supervision of the teaching/learning environment.
- Inability to provide a conducive learning environment.
- Poor recruitment and deployment of Science teachers.

Participants were reminded that the *Inspiring Science Education For Girls Using ICT* project is not about ICT but about using Information Communication Technology (ICT) enhance the teaching and learning of sciences especially for girls.

The school report should therefore highlight the action and the strategies the school has taken or is taking to use Information Communication Technology (ICT) to enhance the teaching and learning of science with the aim of increasing the number of girls taking sciences and improving their performance in science subjects.

## Reports from the schools

### 1. Kyeizoba Girls School

- Made a report to the Head teacher about the Teachers' Integrating ICT in Science teaching held at Gayaza High School (23<sup>rd</sup> -25<sup>th</sup> ) April, 2007.
- Briefed the teachers about the workshop during the beginning of term meeting.
- Incorporated ICTprograms in the Term II Work plan.
- Trained group often meet at the same Internet café to explore the Internet. Downloaded some past papers from the Uganda Digital Education Resource Bank ([www.uderb.org](http://www.uderb.org)) – the project website.
- School has agreed to connect the computer lab to the Internet.
- One of the teachers of S5 started using some of the materials which were given out during the Gayaza Workshop. This has inspired the other teachers to use some of the materials.
- The S2 students have been introduced to Chemistry titrations using the virtual chemistry labs over the weekend. They will start using the real apparatus in the 3<sup>rd</sup> term.

- One of the teachers bought a laptop which he is using to train the administrators.
- If the innovation is to work, the teachers must be trained first. Requested the project coordinator to assist the schools in conducting the teachers' training.
- Future plans include training of teachers, installation of the Internet and buying the projector.

## 2. Muni Girls School

- Gave a report to the school administration.
- Training of other science teachers has not taken place due to logistical issues but a number of teachers have been trained individually.
- Installed the virtual labs on the school computers and asked the students to do the virtual practicals. The students made a presentation of what they had done to other students during the Muni Day.
- Took students to an Internet café (8 km from the school) and trained them how to use the Internet using the Internet Scavenger hunt manual provided at the Gayaza workshop.
- Got relevant Internet sites and emailed them to the Project coordinator to be shared with other schools.
- Discovered that using computers as tools to support science teaching:
  - Cultivated students' interest in doing what they previously considered very difficult.
  - Narrowed the gap between the student and the learning resources.
  - Using virtual science labs removed the fear of breaking the apparatus from students and had no extra cost.
  - Reduces the teachers' work load. Just introduce the students to what to do and let them continue exploring on their own.

## 3. Ngora Girls School

- Used the beginning of term meeting to sensitize the teachers.
- Head teacher attended one of the workshops on ICT and is quite keen to support ICT activities in the school.
- Introduced ICT skills training for all classes and these are conducted for separate classes throughout the week.
- ICT has been incorporated in the work plan for the sciences and Tuesdays are used to introduce the idea of using ICT in sciences.
- Hopes to use virtual labs in addition to the real labs.

## 4. Wanyange Girls School

- School has two video cameras, a computer lab and some students offer computer studies as a subject.
- Administration has promised to buy more computers and a projector.

- Started with small groups of students who don't do computer studies as a student and interested them in using the Internet to search for more information related to sciences other than just sending emails to friends. This was done by showing them sites with animations and simulations.
- Encouraged other teachers to use the Internet to update their notes.
- Teachers are using computers to electronise their notes and to compute students marks. Parents were very happy when they found that the teachers had used computers to compute the marks.
- Downloaded some past papers from the Uganda Digital Education Resource Bank ([www.uderb.org](http://www.uderb.org)) and used them for tests.
- School intends to use mainly video clips to enhance the science teaching.
- Convinced the Director of studies who is also in charge of ICT to start up a science project with an emphasis of using ICT in the science teaching.
- Advocating for more ICT workshops for all teachers in the school.
- One teacher was highly motivated after teaching a science lesson using ICT when one student came to the teacher and commented; "*Teacher, today you have taught. You have not been teaching like this*"

Additional update from the school was received by email from one of the girls who had attended the Science with ICT holiday camp, "NAMWABIRA AMINAH" [aminahsitenda@yahoo.com](mailto:aminahsitenda@yahoo.com).

- S5 science girls have some of their preps from the comp lab on the Internet.
- Some of the lessons are held in the computer lab, illustrated by simulations by teachers and the teachers are really happy about it.
- At least all s5s know how to use ICT for reading and all have e-mail addresses.
- Girls doing Math need some links to math websites and any other math materials.
- Abstract topics are; logarithm, proof by induction, trigonometry, series & sequences, magnetism & optics.
- A number of teachers and students are so eager to join the discussion list [ictcamp@uderb.org](mailto:ictcamp@uderb.org) which was set up during the Science with ICT holiday camp.

Below is the list of teachers who have expressed interest in joining the [ictcamp@uderb.org](mailto:ictcamp@uderb.org) discussion list.

Mr. Luwangula Isma [luwangulai@yahoo.com](mailto:luwangulai@yahoo.com)  
 Mr.Sula Oron [sulaoron@yahoo.co.uk](mailto:sulaoron@yahoo.co.uk)  
 Mr.Kirabe Moses [kirmusa@yahoo.co.uk](mailto:kirmusa@yahoo.co.uk)  
 Mr. Egwali Victor [victoregwali@yahoo.com](mailto:victoregwali@yahoo.com)

Below is the list of students who have expressed interest in joining the [ictcamp@uderb.org](mailto:ictcamp@uderb.org) discussion list.

Walusimbi Hatimah [hatimahl@yahoo.com](mailto:hatimahl@yahoo.com)  
 Buyinza Mariam [buyinzamariam@breakthru.com](mailto:buyinzamariam@breakthru.com)  
 Waako Miriam [waakitie@yahoo.com](mailto:waakitie@yahoo.com)  
 Musenero Claire [clairetira@yahoo.com](mailto:clairetira@yahoo.com)  
 Oyella Lydia [lydlinette@breakthru.com](mailto:lydlinette@breakthru.com)

## 5. Ngora high School

- The administration is very supportive of the ICT activities in the school. The administration has promised to buy a projector.
- Students are time-tabled for computer lessons.
- Time has been allocated for teachers to use the computer lab and the Internet to search for information. Teachers are using less of yellow notes and more of white notes.
- Each of the science departments has a computer and a flash disk. They use the flask disk to store department record, schemes of work, tests and exams.

## 6. Tororo Girls School

- There is a problem of the big number of students as compared to the size of the computer lab. Parents have endorsed the idea of a bigger computer lab for the school.
- Students are doing personal revision using the online Biology book – one of the resources which were provided at the Gayaza Workshop.
- Most teachers have applied to the school to get personal computers.
- Teachers go to the Internet to search for information to improve their teaching.
- Teachers are using computers to prepare their lessons.
- The students are complementing the actual experiments with the virtual experiments.
- Tests and Exam results in the school are processed using a computer.
- The school is also implementing the cyber school solution.
- The school is planning to connect to the Internet.

## 7. Nalinya Lwantale Girls SS

- The school has put a budget for an LCD projector and bought a flash disk for the teachers.
- The typing of the examinations has been computerized.
- One of the teachers downloaded a past paper from the Uganda Digital Education Resource Bank ([www.uderb.org](http://www.uderb.org)).
- The school has computer literate teachers.



- The current computer room is so small, the school has plans to set up a bigger computer room.
- The project is yet to take off.

## 8. Bweranyangi Girls School

- Most teachers are using computers to type their examinations because the secretary can not draw the diagrams.
- Made a report about the Gayaza workshop to the Deputy Head teacher in charge of academics.
- Students don't doze in the science lessons taught in the computer lab like they do in the lessons taught in the chalk-and-talk lessons.
- Shared with other teachers materials from the Uganda Digital Education Resource Bank ([www.uderb.org](http://www.uderb.org)) and taught them how to download the content from the site.
- There is improved attitude of teachers. One of the trained teachers has helped other 5 teachers have been helped to open up email addresses.
- ICT is used in Biology and all students are interested.
- Teachers are sending students to the Internet for research and are also directing students to certain websites.
- Students who attended the "Science with ICT" holiday camp often ask for permission to do Internet research during their free time.
- The computer laboratory is small compared to the number of students (1,500). Teachers are looking forward to a time when computers will get into the Science labs.
- The school is building another computer lab and has promised to buy more computers.
- The exam department is making it a rule that all teachers must hand in typed exams just ready for printing.
- Students who attended the Science with ICT holiday camp are introducing other students how to use of Internet to search for more information.
- Students are given topics to research on the Internet and then present to the rest of the class. Students like this activity very much.

## 9. Dubani Girls School

- The Head teacher of Dubani girls' secondary school sent in a letter of appreciation to SchoolNet Uganda.

The letter read:

*"On my behalf and that of the Board of Governors, PTA and the school community, we highly appreciate your efforts in:*

- *Championing the development of ICT programs in the school.*
- *Inspiring, training and developing the staff in ICT*
- *Inspiring students towards science and ICT and*
- *Giving visionary direction to the school."*

- Started ICT programmes in 2006 with the help of SchoolNet Uganda.
- The school has put in place an ICT team comprising of the teachers who attended the Gayaza Workshop, headed by Ms Diana Nalubega, charged with the responsibility of coordinating and budgeting for ICT activities in the school.
- ICT has been integrated in the school timetable.
  - School conducts basic ICT training for teachers and students and are issued with certificates at the end of the training. Teachers were complaining that they can not use ICT for teaching if they are ICT literate.
  - The school has a collection of CDs for Geography, Mathematics and Sciences.
  - The Board of Governors have approved the ICT budget which includes buying more computers, constructing the Computer Local Area Network (LAN) and connecting the school to the Internet.
  - The school has an ICT lab as separate from the computer lab. The ICT lab has a projector, TV, video deck. The computer lab has 15 PCs and 2 Laser printers.
  - The teachers of Arts feel they are being left out of the ICT activities. The ICT team is working with them to develop their capacity to develop their own learning materials.
  - Teachers use Internet cafes both in Busia-Uganda and those in Busia-Kenya to search for more information. The Internet cafes in Busia – Kenya are both faster and less expensive.
  - The school short term ICT plan includes:
    - All teachers trained in Basic ICT skills by the end of Term 2, 2007.
      - Construction of the Computer Local Area Network (LAN) by end of Term 2, 2007.
      - Connecting the school to the Internet by end Term 3, 2007.

## **10. Ediofe Girls School**

- Gave a comprehensive report to the Head teacher. The Head teacher was happy and availed more computers to the different administrative offices like the Deputy's and secretary's offices.
- The school has a computer lab but is not connected to the Internet.
- Few of the computers have CD-drives. Teachers tried to use external CD-drives but without success.
- Students are allowed once a week to go to the Internet café (run by Makerere University) to do Internet research. Students access the Uganda Digital Education Resource Bank ([www.uderb.org](http://www.uderb.org)) especially for past papers.
- Students have started communicating with teachers via email.
- Teachers who had earlier been discouraged from using the Internet café in Arua town because they had to pay are now using it more frequently.

- There is hope that the school will be connected to the Internet in the near future.

## 11. Gayaza High School

- Seven teachers attended the teachers workshop held at Gayaza High school (23<sup>rd</sup> -25<sup>th</sup>) April 2007.
- Formed an ICT core team comprising of the teachers who attended the Gayaza workshop to drive the ICT school programmes.
- Students are given research work to do using the Internet. The students thereafter teach other students using PowerPoint presentation. Students enjoy and are very attentive during these peer-teaching and peer-learning sessions. The recorded student conducted lessons could be used to facilitate student peer teaching across the country.
- The in-charge of ICT, takes video clips of lessons integrating ICT conducted by both teachers and students. The aim is to preserve these lessons for future use and for advocacy during the staff meetings.
- One teacher, Ronald Ddungu has completed an online professional Development course offered by the International Education and Resource Network (iEARN - <http://www.learn.org> ).
- Teachers are digitizing their notes and booking the computer lab for lessons especially at night.
- Teachers are using Internet sites e.g. <http://uk.innovativeteachers.com> for professional development.
- Parents are helping the school to acquire educational CDs (Germany and Mathematics).
- Teachers and students are helping to identify Internet resources which are relevant to the Uganda curriculum e.g. [www.tryscience.com](http://www.tryscience.com) .
- The School Board of Governors has agreed to increase the Internet bandwidth from 192 Kbps to 384 Kbps so that Internet downloads take a shorter time.
- The school received 10 computers from Kabaka Foundation and is buying 10 others from SchoolNet Uganda.
- The school was represented by four teachers at the eLearning Africa conference held at Safari Park (28<sup>th</sup> -30<sup>th</sup>) May 2007. Two of the teachers got conference bursaries on the last day with the help of the school.
- One teacher and three students will represent the school and the iEARN annual conference and youth camp to be held in Cairo, Egypt (20<sup>th</sup> -26<sup>th</sup>) July, 2007 (<http://www.learn2007.net> ).
- School has learnt that you don't have to spend time teaching students ICT skills, students will acquire them if you used activity-based teaching where students have an outcome (e.g. a presentation) to produce and present to the rest of the class.
- There is continuous advocacy for ICT during the staff meetings.

## 12. Aggrey Memorial School

- Students have developed more interest in science after being exposed to some of the science educational materials on the computer. For example, the computer simulations in the physics virtual laboratory were used while teaching elasticity to S.6 students (verification of Hooke's law) and students really liked it.
- Students go to the computer laboratory in their free time and interact with science materials.
- The school is sure that with time, the students' interest will continue increasing as they are exposed to more educational materials on the computer.
- The school is encouraging staff members to be computer literate and some teachers are developing interest and in future, they will be able to effectively use technology to teach some topics.

### **Opening Remarks by Ministry of Education and Sports and official opening of the workshop.**

Mr. Robinson Nsumba-Lyazi, Assistant Commissioner Secondary (Comprehensive) gave the opening remarks on behalf on the Ministry of Education and Sports. Mr.Nsumba is the National coordinator of the science policy and also in-charge of implementation of ICT in secondary schools.

Mr. Nsumba informed participants that the Ministry of Education and Sports wanted to check whether the schools participating in the *Inspiring Science Education for Girls using ICT* project had computers and were keeping on track with the project activities. The Ministry was also interested in schools sharing experiences and strategies so that they can together move forward.

He reminded participants about two policy directions of the Ministry of Education and sports:

- Making sciences compulsory to all students up to Uganda Certificate of Education (UCE).
- Giving due attention to the Girl child.

He noted that statistics indicate in some schools, the failure rate either doubled or tripled when the sciences were made compulsory. The Ministry of Education and the schools have both to work hard to ensure performance does not go down as a result of making sciences compulsory. Using Information Communication Technology (ICT) is one of the methods of enhancing science teaching and learning, the Ministry of Education is supporting and promoting.

On behalf of the Ministry of Education and Sports, Mr. Nsumba-Lyazi thanked Barclays' Bank Uganda, Digital Links (UK) and SchoolNet Uganda for helping the

Ministry to address the problem of poor performance of girls in sciences through the *Inspiring Science Education for Girls using ICT* project.

He briefed participants about the high level, Ministers of Education workshop which was held at Safari Park Hotel, 28<sup>th</sup> May 2007. He was one of the ministry's technical officers who accompanied the Minister of Education and Sports Uganda. The Ministers agreed on:

- Shared commitment to ICT at all levels of the education sector.
- Digitizing the curriculum
- Ensuring the all the schools have ICT infrastructure.
- Putting in place mechanism for maintaining the ICT infrastructure.
- Ensuring availability of energy for ICT infrastructure including mains grid, stand-by generators and alternative sources like electricity. Ministries of Education should be careful as not to create digital divides with their countries.

Mr. Nsumba-Lyazi highlighted some of ICT in schools initiatives in the Ministry of Education and Sports.

These included:

- The Cyber School Technology which uses digital science curriculum. It is currently implemented at schools like Gayaza High School and Ngora High School.
- The Nepad e-schools concept being implemented at six schools including Kyambogo College School.
- A new initiative supported by Uganda Communication Commission (UCC) which will provide 100 schools across the country with 10 new computers each. He promised that schools participating in the *Inspiring Science Education for Girls using ICT* will be included among the beneficiaries especially those where the project is seen to be progressing.
- The Ministry of Education and Sports in partnership with SchoolNet Uganda, Barclays Bank, Digital Links (UK) are constructing a Computer Refurbishment Centre at Kyambogo College School to be completed by end of July 2007. In addition to providing affordable computers to schools and individual teachers, the centre will conduct technical training for school IT coordinators and students starting from 2<sup>nd</sup> term holiday 2007. Every school will have one trained IT maintenance officer and one trained student. The student will be trained as a way of inspiring other student towards vocational education. The upper floor will host a training centre and conference room. SchoolNet Uganda has committed itself to equip the training centre with a 50 networked computers having a 24hr Internet connection.



**Fig 3: Construction work at Computer Refurbishment centre as of 15/06/07**  
(More about the Computer Refurbishment centre is contained the Permanent Secretary statement – Appendix 2).

- Affordable professionally refurbished brand computers at SchoolNet Uganda Technical Service centre in Kamwokya. Mr. Nsumba encouraged the schools and the individual teachers to buy computers from SchoolNet Uganda at the subsidized price of 250,000/= (UGX) as agreed on with the Ministry of Education.
- Advocacy for political support.
  - The Minister of Education and Sports and the Permanent Secretary are very supportive of ICT in schools as shown by the Ministry's allocation of 200 million Uganda shilling for the construction of the computer refurbishment centre at Kyambogo College School.
  - The Ministry of Education was on the next day going to present to the Parliamentary Committee on ICT on the progress of ICT in the Ministry to lobby for support of the politicians.
  - At school level, the Head teachers should support the ICT activities. The Ministry has organized some ICT sensitization workshops. More workshops are going to be organized for Head teachers.

Mr. Nsumba-Lyazi concluded by asking each school to set targets aimed at improving the performance of students in sciences and work towards achieving those targets. "The 21<sup>st</sup> century is going to be driven by the application of science and technology" he added. He thereafter declared the workshop officially opened.

### **Project update: Inspiring Science Education for Girls Using ICT Project.**

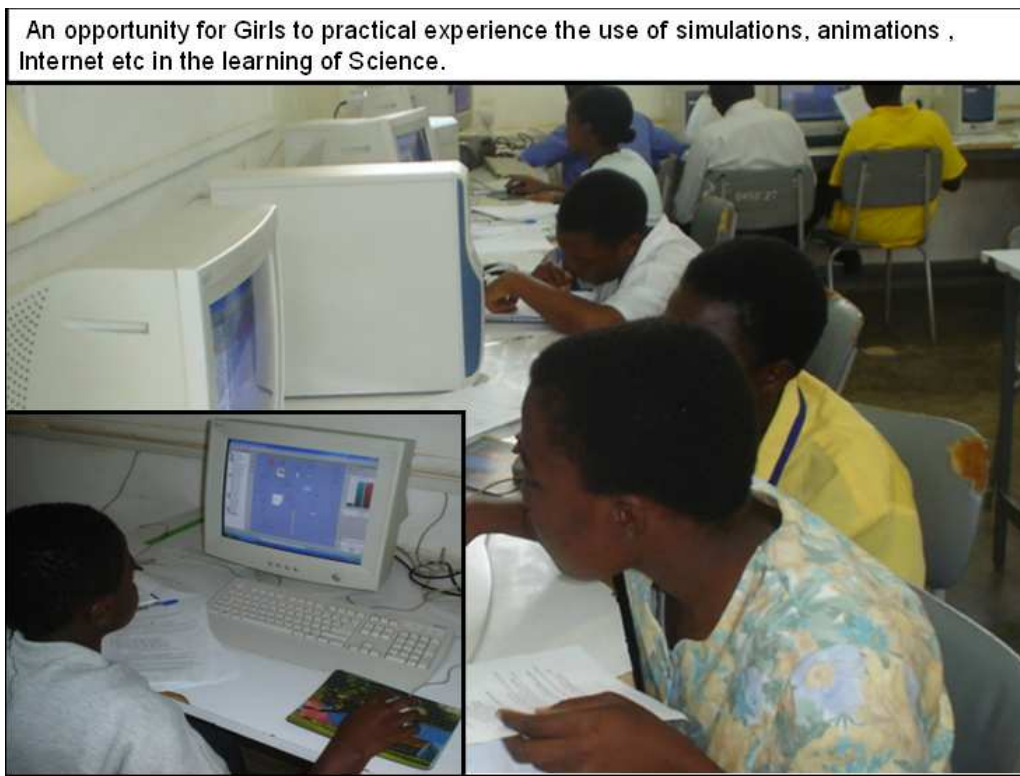
Kakinda Daniel, the projector coordinator briefed the participants about the progress the project had made since science teachers workshop held at Gayaza High school (23<sup>rd</sup> -25<sup>th</sup> )April 2007. The major activities included:

(i) A “Science with ICT” Holiday Training Camp.

A “Science with ICT” was held at Gayaza High School (7<sup>th</sup> -11<sup>th</sup>) May 2007. Three girls offering Physics, Chemistry and Biology (PCB) at A' Level and a female science teacher were invited from each of the schools of; Gayaza High School, Makerere College School, Bweranyangi Girls School, Ediofe Girls, Wanyange Girls School, King's College Budo and Dabani Girls School.

The training holiday camp had the following objectives.

- Provide science students with an opportunity to learn from each and share experiences regarding challenges (factors that negatively affect learners' classroom participation) in the learning of science in Uganda and strategies to address them.
- Cover some of the abstract concepts in Physics, Chemistry and Biology using ICT.
- Expose science students to the use of Internet as a learning resource.
- Enhance students' self esteem, communication and presentation skills.
- Build and enhance students' ICT skills.
- Develop students' positive attitude towards science through personal testimonies of female role models in science related professions.
- Provide students with multimedia interactive digital content which make learning of science engaging and interesting.



**Fig 4: Students attending the Science with ICT holiday camp**

(See Appendix 3 for the student's evaluation of the Science with ICT Holiday camp)

(ii) The Uganda Digital Education Resource Bank UDERB ([www.uderb.org](http://www.uderb.org))

The Uganda Digital Education Resource Bank has continued to grow both in content and usage. Currently the site gets an average of 38 unique visitors everyday. The most popular site content includes past papers and links to interactive Internet websites having science animations and simulations.

The website statistics most users are from Uganda with others from East Africa, Asia, Europe, Australia and North America.

(iii) eLearning Africa Conference

The eLearning Africa conference is an annual conference which brings together eLearning and distance education professions in Africa, enabling participants to develop multinational contacts and partnerships, as well as to enhance their knowledge, expertise and skills. The 2007 eLearning Africa conference was held at Safari Park Hotel, Nairobi Kenya (28<sup>th</sup> -30<sup>th</sup>) May 2007. The conference hosted 1403 participants from 88 countries. Thirteen (13) Uganda teachers got conference bursaries from the conference organizers to attend the conference. They all got the information about the opportunity for bursaries through the UDERB website ([www.uderb.org](http://www.uderb.org)). Seven (8) of the Uganda teachers who



attended the conference are directly involved in the Inspiring Science Education for Girls using ICT project.

These were: Diana Nalubega (Dubani Girls), Kakinda Daniel (SchoolNet), Geoffrey Ntabazi (Mengo SS), Allen Nansubuga (SchoolNet), Kizza Vincent (Gayaza High), Ronald Ddungu (Gayaza High), Jennifer Bbosa (Makerere College) and Lawrence Ssenkubuge (St. Henry's Kitovu).

Kakinda Daniel made a presentation on the project at the conference. The presentation (Part 1 & Part 2) can be downloaded from.

<http://www.uderb.org/category/presentations/>

Ronald Ddungu and Lawrence Ssenkubuge facilitated a Harambee session on introducing ICT in schools. The team also had discussions with the Minister of State for ICT Uganda.

(iv) Knowledge Sharing Workshop

Kakinda Daniel attended the Digital Links (UK) Partners knowledge sharing workshop held on 31<sup>st</sup> May 2007 at Sliver Springs Hotel, Nairobi Kenya. Participants included partners from Kenya, Uganda, Tanzania, South Africa and Cameroon. Discussions centred around sourcing for better and cheaper computers, improving quality of service and dealing with end-of –life computers (e-waste).



**Fig. 5: Participants of Digital Links Partners workshop.**

(v) Computer Refurbishment Centre.

The Ministry of Education and Sports provided 200 million Uganda shillings for the construction of a computer refurbishment centre at Kyambogo College School. The centre will be the home of the Inspiring Science Education for Girls with ICT project home. Mr. David Sogan, CEO Digital Links (UK) was the Guest of

Honour. The Permanent Secretary, Ministry of Education, Mr. F.X Lubanga made a statement on how the centre was going to be used. (See Appendix 2).



**Fig. 6: Mr. F.X Lubanga and Mr. David Sogan breaking the ground for the Computer Refurbishment Centre on 01/06/07.**

(vi) Business and Study tour to London, UK

Kakinda Daniel made a business and study tour to London, UK (8<sup>th</sup> -12<sup>th</sup>) June 2007.

He visited the following organizations/companies.

- Friday 8<sup>th</sup> June, 2007 : Kakinda visited Rafi.ki Online Community ([www.rafi.ki](http://www.rafi.ki))

Rafi.ki is a not-for-profit online community for schools around the globe. Schools can use the Rafi.ki website to find schools to work with across the world, work on curriculum projects with other schools, swap lesson plans, arrange international trips and talk safely to other schools with email, chat rooms, video and audio conferences.

The project schools will soon be introduced to the Rafi.ki Online Community.

- Monday 11<sup>th</sup> June, 2007: Kakinda visited CKS Group computer refurbishment centre and Midex Reverse Technologies LTD in London, UK. Both visits were arranged by David Sogan, CEO Digital Links (UK). The study visit was aimed at building relationships, gaining first hand information and visual experience of the computer refurbishment process and re-cycling of end-of-life computers and soliciting for technical assistance. The knowledge and experience obtained will be used in setting up the computer refurbished centre at Kyambogo College School.

- Tuesday 12<sup>th</sup> June, 2007: Kakinda Daniel and David Sogan made a joint presentation about how the refurbished computers are put to good educational use to the staff of E,ON UK. E.ON is one of the biggest energy companies in Europe.

The company promised to help the project by:

- Supporting the importation of computers to Uganda schools
- Sending a technical person to facilitate a Train-of-Trainers technical workshop.
- Support with appropriate alternative energy solutions.

### **Introduction to Constructivist, Learner-Centred Pedagogy.**

(This section was facilitated by Kakinda Daniel)

A 20 min video episode: **Digital Anatomy** produced by SouthCentral Regional Technology in Education consortium and The Voyage of Discovery project was used to introduce the concept of constructivist, learner-centred pedagogy.

Objectives of watching the video were to:

- Create an understanding of the principles of constructivism and how they are exemplified in classroom settings.
- View a learning environment in which the teacher is a facilitator and the learners are engaged in self-directed collaborative activities.
- Demonstrate a method of how teachers can integrate technology in their subjects.
- Create an understanding of what active-learning and learner-centred approach is.

Post-viewing Questions.

Participants were asked to reflect on the following questions as they watched the video.

- What technologies were used in the video?
- What instructional strategies are used in the video?
- What constructivist principles are presented in the video?
- In what ways does the teaching methodology presented in the video differ from that in our classes?
- What have you learned from the video?

The video was followed by a discussion guided by the post-viewing questions. Harmonizing the discussions:

Technology used included:

- Digital Camera
- Computers (shared)

- Video Camera
- Internet Browser
- A projection device (Big monitor, TV,)

Instructional Strategies used in the Video.

The teacher used a combination of instructional strategies which included:

- Whole group, facilitator-led discussion.
- Minimum direct instruction
- Collaborative small group activity.
- Small group presentation to the whole group
- Peer review and evaluation

Constructivist Principles presented in the video

- Learners bring unique prior knowledge, experience and beliefs to the learning situation.
- Knowledge is constructed in multiple ways through a variety of authentic tools, resources, experiences and contexts.
- Social interaction introduces multiple perspectives through reflection, collaboration, negotiation and shared meaning.
- Learning is both an active and a reflective process.

## **Introduction to Inquiry-Based Science Learning**

*(By Namusana Hellen, Nyamaganda Olivia and Sebayiga Solomon)*

(i). What is “Inquiry Based Science Education”?

*Learning science is something students do, not something that is done to them. In learning science, students describe objects and events, ask questions, acquire knowledge, construct explanations, test explanations and communicate their ideas to others” NSES, NRC, 1996*

Inquiry-Based Science Education:

- Is characterized by empirical data, logical argument and skeptical review. *NSES, NRC, 1996*
- Involves a process of exploring the natural or material world, along the way the inquirer is collecting and recording data, making representations of results and explanations, drawing upon other resources, such as books, videos and colleagues” *Exploratorium*
- Involves ; Skillful questioning, Prediction, Discussion, Experimentation, Problem Solving and Conclusion

(ii). If you went into an Inquiry Based Science Education (IBSE) classroom, what would you expect to see?

- Student –centered teaching methods.
- Student and teacher directed learning.
- Structured using a learning cycle based on research as to how people learn.
- In depth extended study of “big ideas” with a coherent conceptual storyline.
- Experiences with authentic materials predominate.
- Science notebooks, student writing, reading and research.
- Wide variety of assessment strategies: mainly formative.

When conducting a Inquiry Based Science Education lesson,

- Consider pre-existing ideas of learners.
- Provide a deep foundation of factual knowledge tied to “Big Ideas.”
- Develop a conceptual framework that facilitates learning.
- Use a variety of strategies to develop metacognitive abilities of learners

(iii) Hands-on Activities

Participants were given some local materials and asked to improve two experiments that can be used to detect the presence of wind and to detect wind direction?

(iv). Some Characteristics of Inquiry-Based Science Learning:

Hands-on; Materials rich; Data Driven/ Evidence based; Student Recorded; Teacher facilitated; Technology enhanced; Text supported; Question focused and Group oriented

(v) The Key Elements of Inquiry –Based Science Education.

- Learners are *engaged* by scientifically oriented questions.
- Learners give priority to *evidence*, which allows them to develop and evaluate explanations.
- Learners formulate *explanations* from evidence to address scientifically oriented questions.
- Learners *evaluate* their explanations in light of alternative explanations.
- Learners *communicate* and justify their proposed explanations.

(vi). Challenges of implementing Inquiry Based Science Education in Uganda

- ATTITUDE: Teachers, student and school administrators
- METHODS: Teacher –centered teaching methods, low learner involvement low and ignoring of experimental work by teachers.
- COMPETENCE: Lack subject content mastery, skills and innovativeness.

- RESOURCES: Shortage/Lack of teaching and learning resources
- GUIDANCE: Teachers left on their own to try the curriculum in class etc

(vii) Video show

Sample lesson of Biology from JICA was viewed by the participants and after which a discussion followed

(viii) Matters arising from the presentation

- Participants wanted to the difference between constructivism and Inquiry Based Science Education as a method of teaching/ learning (Response: All aim at equipping the learner with practical knowledge/ inquiry basic skills)
- One of the participants said that it was a good idea but they did not have time to improvise since the syllabus is exam oriented aimed at finishing what was already planned.
- One of the participants wanted to know how Information Communication Technology can be applied to Inquiry Based Science Education as a component of teaching / learning process.
- Most participants bought the idea but requested for an increase in their remuneration (salary) to a reasonable amount. That let the Government through the Ministry of Education and Sport put science allowance for Science teachers.
- Participants made models to detect the presence of wind but failed to make one to detect wind direction. (They claimed this was obvious).
- Participants looked at the good and bad side of the video show lesson in Biology. This helped us teachers to revise our methods of teaching.

### **Recommendations by participants.**

The participants made the recommendations below which the Ministry of Education and Sports may use to promote Inquiry-Based Science Education in schools.

- There is need to curriculum reform to incorporate Inquiry-Based Science learning.
- Have training workshop for teachers to share experiences and incorporate in aspects to Information Communication Technology (ICT) since this is the way forward.
- Provide motivation for Science Teachers (monetary and non monetary).
- Sensitize stake holders about the need for Inquiry -Based Science Education.
- Provide sample IBSE lessons for teachers to emulate.

- Evenly distribute teaching/learning resources and science teachers across the country.

(ix) Video show

Sample lesson of Biology from JICA was viewed by the participants and after which a discussion followed

(x) Matters arising from the presentation

- Participants wanted to the difference between constructivism and Inquiry Based Science Education as a method of teaching/ learning (Response: All aim at equipping the learner with practical knowledge/ inquiry basic skills)
- One of the participants said that it was a good idea but they did not have time to improvise since the syllabus is exam oriented aimed at finishing what was already planned.
- One of the participants wanted to know how Information Communication Technology can be applied to Inquiry Based Science Education as a component of teaching / learning process.
- Most participants bought the idea but requested for an increase in their remuneration (salary) to a reasonable amount. That let the Government through the Ministry of Education and Sport put science allowance for Science teachers.
- Participants made models to detect the presence of wind but failed to make one to detect wind direction. (They claimed this was obvious).
- Participants looked at the good and bad side of the video show lesson in Biology. This helped us teachers to revise our methods of teaching.

### **Recommendations**

- There is need to change the curriculum
- Have teachers training workshop to share experiences and incorporate in aspects to Information Technology since it is the way forward
- Increase Science Teachers allowance
- Sensitize stalk holders about the need for Inquiry Basic Science Education
- Sample lessons for teachers to follow
- Equal distribution of resources including teachers in the whole country

### **Visit to Kyambogo College School (Tues 19<sup>th</sup> May 2007)**

Kyambogo College School is one of those Uganda secondary schools which are being setup as centres of excellence for ICT in Education. It is one of the six

Nepad e-schools in Uganda. Three of the Nepad e-schools are in the consortium led by HP and three in the consortium led by AMD.

The AMD consortium has three schools of; Kyambogo College School (Kampala), Bukuya SS (Mityana) and St. Andrew Kaggwa (Luwero).

At Kyambogo College school, participants were received by the Headteacher, Mrs. Lubanga who handed them to ICT coordinator, Mr. Charles Yakani (Mobile: 0772751687, email: [yakani@btinternet.com](mailto:yakani@btinternet.com) )



**Fig 7: Mr. Charles Yakani briefing the participants about the operations of the ICT centre.**

(i) What is Nepad e-Schools concept?

Objectives of the Nepad e-Schools

- To provide ICT skills and knowledge to primary school and secondary school student that will enable them to function in the emerging information society and knowledge economy.
- To make every learner health literate.
- To provide teachers with skills to enable them to use ICT as tools to enhance teaching and learning.
- To provide school managers with ICT skills so as facilitates the efficient management and administration in schools

A Nepad e-School must have the following attributes:



- Has appropriate ICT equipment and infrastructure.
- Is connected to the Internet.
- Has teachers trained to impart ICT skills to the students according to agreed curriculum and content.
- Has teachers trained to use ICT for teaching and learning.
- Has access and contributes to teaching and learning materials.
- Has ICTs as tools to enhance the administration and management of the school.
- Has a “health point” i.e. the school should have messages related to health displayed in the classroom and compound

(ii) Brief on the Technology platforms implemented at the school.

Workshop participants were given a brief of the technologies implemented at the schools by the ICT coordinator, Charles Yakani. The schools has both desktop PCs and PICs (Personal Internet Communicator)

Personal Internet Communicator (PIC)



The PIC (Personal Internet Communicator) is robust, easy-to-use (plug & play). It is an, embedded system powered by an AMD GX processor. It has 4 USB ports (support printers, Flash memory, disk drives, and network adapters), 10GB, internal 56K modem, VGA port and a fanless quiet operation.

It has the following pre-installed software on ROM chip : - Linux O/S,

Web-browser, Flash player, Windows Media Player, Image viewer, Ms PowerPoint Viewer, PDF viewer, SoftMaker, Word Processor (TextMaker) and Spreadsheet (PlanMaker).

Advantages of using the PIC

- They use free and open source software. You don't need to pay for the software licence.
- Have low power consumption. They don't even have a fan inside.
- Require no maintenance.

Disadvantages of using the PIC

- Viewer can only allow you view but not to edit. E.g. you can open and view PowerPoint presentations with PowerPoint viewer but you can not edit the presentations.

- You can not install any software on the PICs. All the software must be run from the server.

The school has uses DStv to support the teaching and learning process. Equipment available include: Satellite Dish, Digital Satellite Decoder (DSD), Television (TV), Video Cassette Recorder (VCR), and Remote controls for TV & DSD & VCR, Smartcard slotted into the DSD.

The school accesses the DStv Educational Bouquet which has the following content area. The Educational Bouquet is provided free to the school by Multichoice Africa who is a partner in the AMD Nepad e-schools consortium.

#### Offering of the DStv Educational Bouquet

Offering	Ch.	Content Areas
Discovery Channel	65	Non-fiction entertainment in areas of history, science, technology and world culture
National Geographic	66	Award-winning documentaries (wildlife, exploration, natural phenomena, world culture)
The History Channel	68	Documentaries examining events and experiences (wars, revolutions, inventions)
Animal Planet	67	Wildlife – behaviour patterns of animals
Mindset Learn	100	Educational videos - academic
BBC World	50	News, Documentaries , Current
SABC Africa	53	News, Documentaries , Current

The most popular channel with the students is Mindset.

There is Learnthings Africa educational material for sciences and some other subjects. This material is installed on the server and accessible on the PICs which are networked.

Learningthings Africa who is a partner in the AMD Nepad e-schools consortium. Teachers have been trained on how to integrate Learnthings materials in their curriculum.

### **Watching of live lessons.**

Participants had the opportunity of watching and reviewing two lessons integrating ICT; a Physics lesson for S4 and an English language lesson for S2. Both lessons were conducted in the computer lab.

Participants discussed and agreed to what to watch for in the lessons. Areas of interest included:

- (i) The technology used in the lesson and how it was used.
- (i) The instructional strategies or teaching methods used.
- (ii) The utilization of the available resources.
- (iii) Technical and pedagogical support given to students during the lesson.
- (iv) The sitting arrangement.
- (v) Student activities given

### **What participants learned from the school visit.**

Participants were asked what they had learned from the school visit. Below are some of the participants' responses.

- All students can benefit from using the ICT resources at a school.
- I have observed a lesson taught using ICT and would like emulate the lesson.
- The organisation of the computer lab is superb.
- Proper preparation for all lessons using ICT is essential. Preparations should be both pedagogical and technical.
- The issue of management of the laboratory with the limitations staff can be addressed by inviting in other teachers to help.
- I am impressed by the willingness of the school to immediately take up the challenge of hosting the group in a very short time.
- Students were highly disciplined and there were strict lab rules.
- There is value added the use of the computer lab when students are brought to the lab to carry out academic activities.
- There was good time management during the lesson.
- The teachers were comfortable, not controlled by technology.
- Learnt the need for a proper environment in the computer lab.
- I got convicted that ICT can enhance teaching and learning.

### **Advocating for ICT in schools**

(Session lead by Lawrence Ssenkubuge)

Advocacy comprises of the strategies devised, actions taken and solutions proposed to influence decision-making to create a positive irreversible change. ICT in schools goes much beyond buying computers and setting up the ICT infrastructure. Real benefits (improving educational outcomes) requires setting

up the infrastructure, maintaining it and building capacity for the school administration, the teachers and the students to optimally utilize the ICT resources. As change agents we need to know that setting up the technology is the easiest part of the whole process, and changing people is the most difficult part. We need to invest time and energy advocating the ICT in our schools so that we can get all the stakeholders support and use mainstream ICT in the school activities.

Below are some of the tricks participants were given which they could use to advocate for ICT in their schools.

(i) Identify the stakeholders and develop an advocacy strategy. Some of the stakeholders for the successful introduction and implementation of ICT in schools are: Ministry of Education, School administration (Head teachers, Deputies, Director of Studies), parents, students, teachers, PTA, Board of Governors, and non-teaching staff.

In order to develop an Advocacy Strategy, ask yourself the following five questions.

1. What you want to achieve? (Buy equipment, train teachers, etc..)
2. Who can give it to you? (Stakeholder)
3. What does the stakeholder need to hear?
4. Who does the stakeholder need to hear it from?
5. How can you get the stakeholder hear it? (Delivery mechanism)

(ii) Methods of advocating for ICT in schools include:

- Use ICT instead of merely talking about it.
- Entice the most influential stakeholders.
- Be in the “good” books of the most influential stakeholders.
- Work with students and create products (school website, presentations, and exhibitions).
- Report every thing related to ICT in the school highlighting the positive achievements.
- Demonstrate how ICT can enhance teaching and learning.
- Show how ICT improve efficiency and cut down costs.
- Invite ICT in Education resource persons to make presentations at the school.
- Set up a school ICT committee and a student ICT club.
- Develop materials for advocacy.
- Host national teachers ICT workshops. This helps to get more teachers involved.
- Participate in national and international educators’ ICT workshops.

(iii) Methods that work for Head teachers

Head teachers are interested in improving the school image, improving the academic standards but still fit in the limited school budget.

- Use ICT for computing students mark and processing students reports.
- Use ICT for making multimedia presentations (text, sound, video, and graphics) at school Board meetings and at Annual PTA meetings.
- Improve communication with teachers and parents (typed circulars, reports, email).
- Offer free training on how to use PowerPoint, Internet and email.
- Solicit opportunities for computer donations, invitations to national and International workshops.
- Update them periodically on how teachers and students are using ICT for teaching and learning.
- Learn ICT troubleshooting, maintenance and 1<sup>st</sup> level technical support so as to cut down costs.
- Offer free training to teachers. Let them sign the certificates and officiate at the closing & opening ceremonies.

(iv) Methods that work for teachers.

Teachers are extremely critical in the success of ICT integration in the school. Teachers must have a positive attitude, skills and competence to use ICT in their teaching. Using ICT will require more time and preparation from the teachers. The following methods normally work for teachers.

- “Walking the Talk”. The advocate should be seen using ICT.
- Start with things which are immediately useful to them e.g. computing students’ marks and positioning, reading newspapers from the Internet, searching for information on the Internet, sending an email to a friend.
- Have teachers attending workshops where ICT is seen to work.
- Increase teachers’ accessibility to ICT e.g. extending the Internet to the staff room and to the Departments or setting up a teachers’ ICT centre.
- Sometimes a bit of policy directives work e.g. Demand typed examinations from them, typed Department reports etc.

(v) Methods that work for students.

Students are the best group to use for advocating for ICT in the school because parents believe so much in what their children say. In addition, peer- teaching and peer- learning produces the highest multiplier effect.

Methods that work for students include:

- Inviting resource persons to make presentations on the use of ICT in education and in other sectors.
- Involving them in tele-collaborative projects with students of other schools and other countries.

- Having them participate in international contests like Think Quest, Mtandao Afrika, Capital Markets etc.
- Provide reference to Internet websites for classroom research.
- Asking them to prepare presentations and teach others using ICT.
- Involve the ICT club in training other students.
- Use digital interactive multimedia content (video, simulations, animations, graphics) in your teaching.

Methods which work for the Ministry of Education and Sports.

Ideally all things that happen in Uganda schools must be approved by the Ministry of Education and Sports.

- Include a budget line for ICT developments in the budget to be approved by the Ministry.
- Help the Ministry to implement its ICT programs e.g. by readily sending teachers when invited for training by the Ministry.
- Provide periodic progressive reports on ICT integration in the school e.g. how many teachers have been trained, what type of training was given.
- Invite the Ministry to officiate at the award of certificates to trained teachers and at ICT exhibitions.

Methods that work for the Parents include.

- Just involve their children. Once the parents see their children benefiting, they automatically support the program.
- Set up a mailing list for the parents. Easy communication with the school through email.
- Invite them to the school ICT exhibitions.
- Demonstrate how ICT can be used to simplify teaching and make learning more interesting at Parents' meetings.

Methods that work for Board of Governors include:

- Making a Technology Plan.
- ICT exhibitions
- Regular reports
- Invitation to attend and preside over school events where ICT is used.

**Remarks and official closing by the Ministry of Education and Sports.**

Mr. Robinson Nsumba-Lyazi, Assistant Commissioner Secondary Education (Comprehensive) made the closing remarks on behalf of the Ministry of Education and Sports.

In his closing remarks, Mr. Nsumba-Lyazi;

- Thanked those Head teachers who were able to send 5 teachers to the workshop and appealed to those who were not able to send the 5 teachers to do better next time.
- Told participants that it was now government policy that the teaching should be supported by ICT. The Ministry will from time to time, invite teachers for professional retreats like this one as part of its efforts to retrain the teachers and expects the schools and the teachers to respond positively. It is during such workshops that teachers are introduced to new policy directions and new methods of teaching.
- Highlighted the prevailing high rates of failure in science and he pointed out that it was hope of the Ministry of Education that the use of ICT in teaching of science especially that of the girls would help improve the situation.
- Warned that teachers who won't embrace ICT as a tool for enhancing teaching and learning will soon find themselves obsolete. Such teachers will not be able to cope with the modern ways of teaching and may not be competitive.
- Called upon the participants to communicate and share amongst them, for by sharing they would be able to cause a multiplier effect. He also told them that he would keep in touch with them so as to be constantly updated of their success in the quest for enhancing science using ICT.
- Proposed that schools currently with no ICT facilities should utilize the Internet cafes so as to open up opportunities for their students.
- Explained that the participants had been taken for a study tour to Kyambogo College School in order to see how the other schools have moved forward with ICT integration.
- Challenged the participants not to spend a lot of time teaching students (except those offering computer studies as a subject) how the Internet or email works, just train the students to use it as a tool for learning.
- Assured participants of the Ministry of Education and Sports commitment to supporting efforts to bring ICT to schools as exhibited in the funding of the building of the computer refurbishment centre at Kyambogo College School, the cyber schools project and the Nepad e- schools program that was being implemented in a number of schools across the country.

He thereafter declared the workshop officially closed.

Report was compiled by Kakinda Daniel, Executive Director, SchoolNet Uganda

### Appendix 1: List of Workshop Participants

No.	Names	School/Organization	Phone number
1	Kakinda Daniel	SchoolNet Uganda	0772820167
2	Chebet Milton	Gayaza High School	0782068382
3	Kizza Vincent	Gayaza High School	0712812130
4	Ogoya Paul	Ediofe Girls' School	0782541500
5	Angudri Joeh	Ediofe Girls' School	0774589080
6	Mugisha N. Katson	Kyeizoba Girls' S.S	0752488873
7	Jurua Charles	Ediofe Girls' School	0782999337
8	Alioni Lcciano Cazu	Ediofe Girls' School	0782901994
9	Adrabo Atiku Robert	Muni Girls' School	0772646264
10	Asiki Michael Maxwell	Muni Girls' School	0772532151
11	Aisu Justine	Ngora High School	0782982678
12	Ekongot John	Ngora High School	0772663600
13	Oluka John Emmanuel	Ngora High School	0772933245
14	Matua Eliakim	Muni Girls' School	0782833838
15	Kigozi Edward	Bishops' S.S Mukono	0712809040
16	Mulindwa Godfrey	Bishops' S.S Mukono	0752256262
17	Kafumbe Moses	Nalinya Lwantale S.S	0712687456
18	Sentongo Drake	Bishops' S.S Mukono	0772619893
19	Lugya Richard Kibuuka	Bishops' S.S Mukono	0774036040
20	Okoya Peter James	Dabani Girls' S.S	0772585454
21	Tom Wabwire	Dabani Girls' S.S	0774935113
22	Nalubega Diana	Dabani Girls' S.S	0774214215
23	Okuta Dominic	Tororo Girls'	0712865906
24	Draleku John	Ediofe Girls' S.S	0772853279
25	Kataike Sarah	Nalinya Lwantale S.S	0752320691
26	Wamala Emmanuel	Wanyange Girls' S.S	0712971338
27	Kirabe Moses	Wanyange Girls' S.S	0772567566
28	Bamuleke Edith	Wanyange Girls' S.S	0782803350
29	Etuwat Joseph	Ngora Girls' S.S	0774695973
30	Ochaga Peter	Ngora Girls' S.S	0782706698
31	Olinga Sam	Ngora Girls' S.S	0772471562
32	Baguma Denis	Kyeizooba Girls' S.S	0772980857
33	Ayikoru Neenah	Muni Girls' S.S	0782522525
34	Nakalembe Solome	Dabani Girls' S.S	0782532269
35	Nyamaganda Olivia	Kitende S.S	0772616101
36	Namusana Hellen	Lubiri S.S	0772901012
37	Sebayiga Solomon	Buloba High School	0752654682
38	Katiiti Gladys	Nalinya Lwantale Girls'	0782696306
39	Asiru Rosalind	Muni Girls' S.S	0772920148
40	Barasa Stephen M.	Dabani Girls' S.S	0782168316



41	Andima Moses	Tororo Girls' School	0712024908
42	Tukahirwa Evas B.	Bweranyangi Girls' S.S	0774138985
43	Adongo Phoebe	Ngora Girls' S.S	0782121968
44	Lucy. S. Nakiboneka	Gayaza High School	0772416197
45	Ronald Ddungu	Gayaza High School	0772433879
46	Richard Walugere	Makerere College Sch	0772420138
47	Kalyesubula Dan	Bishops' S.S Mukono	0782631758
48	Ndagire Majaine	Nalinya Lwantale Girls'	0772544861
49	Allen Nansubuga	SchoolNet Uganda	0772362373

**Appendix 2: STATEMENT BY MR FRANCIS X.K. LUBANGA, PERMANENT SECRETARY/MINISTRY OF EDUCATION AND SPORTS ON THE OCCASION OF BREAKING THE GROUND FOR THE SCHOOLS' REFURBISHMENT CENTRE AT KYAMBOGO COLLEGE SCHOOL ON 1/6/ 07**

Distinguished guests  
Ladies and gentlemen

The 21<sup>st</sup> Century is mainly going to be characterized by a lot of application of science and technology in every day life. There is now overwhelming importance and use of Information Communication Technology ICT in modern society. Today most experts recognize ICT as a powerful accelerator of development. It is also a fact that education is the single most important factor for development and wealth creation. This suggests that it is imperative for all teachers and students to become familiar with and accept ICT in every day use. Therefore students' acquisition of computer literacy and application skills should become a major feature and objective of our education system. The learners/students should be given skills to be able to use ICT in every day life. This will enable them to create employment for themselves and also to have the right skills for the very competitive job marked. Above all, it will enhance their communication skills in digital world trade and learning where communication via the Internet is becoming the order of the day. The teachers should also be trained in the use of digital software in the delivery of their lessons. It has been established that schools using computers with learning software such as Encarta Resource Programme or Cyber Schools Technology Solutions performed better, especially in Mathematics and Sciences than those without.

The Ministry is ready and committed to fast track the use of ICT in the teaching and learning processes in our schools. ICT in education in Uganda is going to become the cornerstone of our human resource and manpower development and capacity building country wide.

Already several initiatives have been launched like:

- (i)** The Nepad e-Schools.
- (ii)** Cyber School Technology Solutions to improve the teaching of sciences in secondary schools
- (iii)** Connect – Ed in Teacher Training Colleges
- (iv)** ICT initiatives at Tertiary/University level. These include:
  - The launching of the digital library at Makerere University Business School.
  - The establishment of a digital library with funding from Carnage Cooperation of US\$ 2.5m. The project will shortly be launched.
  - The establishment of a Computing and Information Science centre at Makerere University, which will house 6,000 computers.
  - The introduction of a computer science degree course at Busitema University.

There are a number of proposals at hand for more ICT projects/programme. A project to support schools with ICT infrastructure is about to start with the support of the Uganda Communications Commission. One hundred schools /institutions will benefit, with each school receiving ten computers, some printers etc. We hope to distribute slightly over 1000 computers.

All these initiatives seek to ensure over the next decade all schools/institutions in Uganda:

- a) Have appropriate ICT equipment and infrastructure.
- b) Are connected to the internet.
- c) Have teachers trained to impart ICT skills to students and use ICT as pedagogical tool.
- d) Have digitalized curricular.
- e) Have access to digitalized teaching and learning materials.

We are here today to break the ground for the Kyambogo College School Computer Refurbishment Centre. The Ministry has committed Shs 200m (Two hundred million) to construct the centre. This new initiative of establishing a computer refurbishment centre is meant to support and consolidate the earlier initiatives. The centre is:

- a) Provide affordable refurbished computers to Uganda schools.
- b) Provide technical training to school IT coordinators, teachers and students. Technical training workshops on computers assembling, trouble shooting & Maintenance and Networking will be conducted at the centre. This will reduce the cost of technically sustaining the increasing number of computer in schools.
- c) Developing technical marketable skills among students graduating from secondary schools. Interested students from the hosting and neighbouring schools will be given the opportunity of training and working at the computer refurbishment centre and holiday ICT technical camps will be organized for students from schools participating in the programme.

- d) Provide “industrial training” and internship for students from higher institutions.
- e) Act as a centre for innovation. The centre will also be engaged in trying and testing alternative appropriate technologies.
- f) Provide low cost technical support to the schools through the use of student interns, students on industrial training and local/international volunteers.
- g) Serve as source of computer spare parts for schools using refurbished sets.
- h) Serve as a centre of collection of end-of-life computers (e-waste) from schools for dismantling and disposal in an environmentally friendly manner.
- i) Serve as a centre where practical ICT sensitization workshops for teachers, head teachers of schools and other education offices can be carried out.
- j) Serve as a place where ICT in Education shows and exhibitions open to the general public may be organized to show the best practices in ICT integration in different subjects.
- k) Serve as a training school where teachers can be trained both in ICT skills and how to integrate ICT in their curriculum.

Kyambogo College School is being developed into a centre of excellence/model school in the use of ICT in the teaching and learning process. Other schools in the catchment area will be encouraged to use the facilities at this centre.

It is gratifying to note that there are partners in development who are ready to support the Ministry of Education to make the centre fully operational. The partners are Digital Links, SchoolNet Uganda and Barclays Bank. We thank them for helping Uganda to close the digital gap. We thank them for enabling us to create a brighter future for our students.

Thank you for your attention.

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### **Appendix 3: Student Evaluation of the Science with ICT Holiday Camp**

#### **1. What did you feel when you got to know that you had been invited to a “Science with ICT” holiday camp for girls (Expectations, fears, uncertainties, etc).**

Expectations:

- To acquire better ways of understanding science.
- To get to know how to use the Internet.
- To get very many new friends.
- To be able to acquire an e-mail address and use it effectively.

Fears

- Not being able to cope with taking in very many new concepts at ago.
- I thought, I would find arrogant and proud people who would not help a slow learner like me.
- Feared that work would be too much and hard.
- I feared that the workshop organisers would not take care of us.

#### **2. Which of your expectations have you achieved in the camp?**

- Very good feeding.
- Making new friends.
- Learning how to use the computer to access information.
- I have learnt so many skills like accessing the Internet, using e-mail and I feel confident about them.
- This is the only time, I have been longer on the computer.
- I now know much more about other schools and have come to appreciate a lot more about my surroundings.
- The skill of separating junk from relevant information while I do research has been installed in me.
- Some subjects have been demonstrated, knowledge of ICT and we are now more literate and more competitive.
- Have been exposed to the use of ICT to enhance teaching and more so becoming gender sensitive in class. (I am re-awakened).
- I have learned to work and share with others.
- I was able to send email to many people using the mailing list. It would be tiresome to write the same message over again.

#### **3. Which of the fears you had, have you been able to overcome?**

- Entire environment has been friendly.
- We had enough time to do our work. There were no power shortages as the generators were also used in case power went off.

- I was exposed to better notes on the Internet so I indeed did better reading than what I had expected.
- Good hospitality.
- I realised that we all had equal potential therefore the belief that others are better than me has been completely wiped out of my mind.
- I have not wasted any time and this will always be a camp to remember.

#### **4. You as a person, what are the challenges which you face in the learning of science or the teaching of science?**

- Scarcity of teachers whereby I have to keep my question until the teacher shows up.
- Question approach has been a problem.
- Lack of enough equipment in the laboratories.
- There is a lot to cover in a short time.
- The frequent assumptions made in science annoy me. E.g. The assumptions made in the Simple Kinetic Theory of gases.
- The discouraging teachers who tell us that some of us can not manage sciences.
- Limited references. The common reference always used is the books. No use of science software.
- Heavy work load on the part of the teacher.
- The syllabus is too demanding.
- Teaching the abstract concepts is difficult.
- Chemistry requires a lot of cram work e.g. equations and mechanisms.
- Balancing the different levels of ability in class.
- Visualizing abstract science concepts.

#### **5. What things have you liked most at the camp?**

- Experiments in the virtual labs.
- Approachable facilitators.
- Learning how to use PowerPoint.
- Good feeding.
- The importance of saving our work in files periodically.
- The brain storming sessions. These sharpened our minds.
- Skills of reporting and presenting.
- Sending email to many people using the mailing list ([ictcamp@uwaterloo.ca](mailto:ictcamp@uwaterloo.ca)).
- The willingness of people to lend out a helping hand to to each other.
- The personal testimonies.
- The presentation on how to integrate music in science teaching.
- The ICT knowledge acquired.
- The interactions with facilitators and students from other schools.

## 6. What things have you disliked most at the camp?

- The boring Chemistry lesson.
- Poor time management.
- Breaking some of the ground rules like the rule for always starting and ending with a prayer was often broken.
- When I don't have chance to work on the computer.
- Interruptions due to unstable electricity.

## 7. What do you think you have benefited from attending the camp?

- Gained a lot of technology skills e.g. how to use the Internet for research work.
- I have built myself confidence and esteem from people's testimonies.
- I have learned never to give up on sciences whatever the circumstances.
- To socialize with different people.
- Using Internet for educational purposes.
- I have learned to use the virtual labs so I can practice my practicals without the teacher.
- Self esteem, the fact that I was given time to speak.
- Setting goals & working on achieving them.
- I have learned the richness of using ICT as learning and teaching tool.
- Exposure to useful websites like the Uganda Digital Education Resource Bank (UDERB(<http://www.uderb.org>)).
- Typing was enjoyable to me, I learnt many new skills.

## 8. What is your way forward? (What do you intend to do after the camp?)

- To go and utilize the Internet for research in order to improve my science.
- To teach my parents, relatives and friends about this.
- To start an ICT club at school through the Head teacher.
- To include this on the science club programme in my school.
- I intend to tell my head teacher about the power of ICT in teaching and convince him to stock more computers at school.
- I intend to tell my teachers to try using ICT in teaching so as to improve the educational standards.
- I intend to go and talk to the Minister of Education and sports about how good it is to use computers for studies. Instead of donating books to schools, the Ministry should offer computers to schools.

## 9. Did you find the personal testimonies useful? What did you learn from them?

- I have learnt from them to believe in myself and ignore people's confessions about me.
- Never give up.
- Learnt that good things come to those who try and persist though things may seem to be hard.
- I learnt that I need to keep focussed.
- How set targets and how to work on them.
- Actually we girls can do better than boys in sciences.
- Made me to acquire a new self-drive "I can still do better"

**10. What suggestions would you give to the project partners regarding reaching most students especially girls?**

- To assist the third world schools with ICT.
- To request the Ministry of Education to offer to buy computers for the schools which don't have them.
- To extend the project to rural schools so that other students get a chance to know these wonderful things.
- To actually organize such camps very often.

**11. What suggestions do you have to the Ministry of Education and Sports?**

- ICT should be considered as a very important way of learning or more so copy the Ethiopian style of learning.
- Design a policy for all teachers to attend at least one workshop on the integration of ICT in order to sensitize and empower all science teachers.
- Some teachers should be taught the skill of using computers in teaching science.
- Textbooks are getting out of fashion so something like computers should be installed to help us understand better.
- HSC science lessons should be conducted in the computer labs.
- It should invest a lot in the girl child education especially sciences. E.g. by conducting camps like this one.
- The Ministry should try simplifying the setting of exams and should train more science teachers.
- It should construct computer labs for all schools.