# Information and Communication Technology for Development (ICT4D) in Education.

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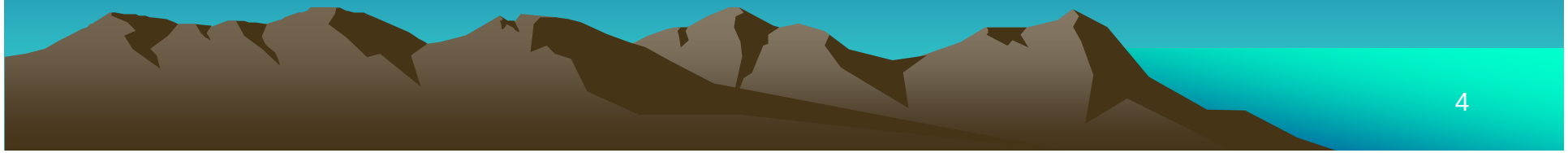
# 1.0. PROLOGUE AND PHILOSOPHY

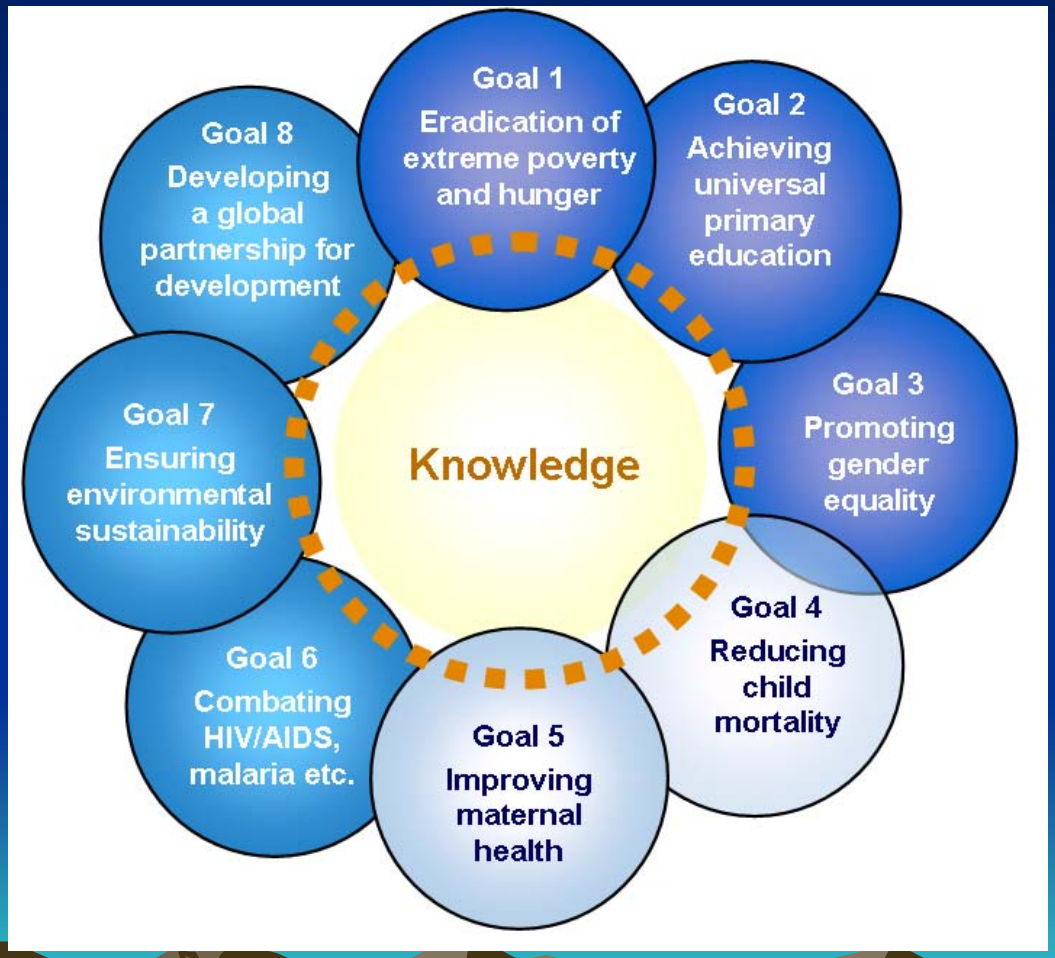
- **“Maendeleo ni ya Watu siyo ya vitu” (Julius Nyerere)**
- **The concept of human development has become the leading alternative to the view of development equated exclusively with economic growth. Human development focuses on people (UNDP)**
- **Human development implies that *people’s capabilities are enhanced* and their lives enriched. It is a process of enlarging people’s choices, which is achieved by expanding human capabilities and functioning.**
- **Essential capabilities for human development are:**
  - **people to lead long and healthy lives**
  - **to be knowledgeable**
  - **to have access to resources for decent living**
  - **participation**

- **Essential capabilities for human development are:**
  - **people to lead long and healthy lives**
  - **to be knowledgeable**
  - **to have access to resources for decent living**
  - **participation**

- **Making people knowledgeable is the only way of developing people**

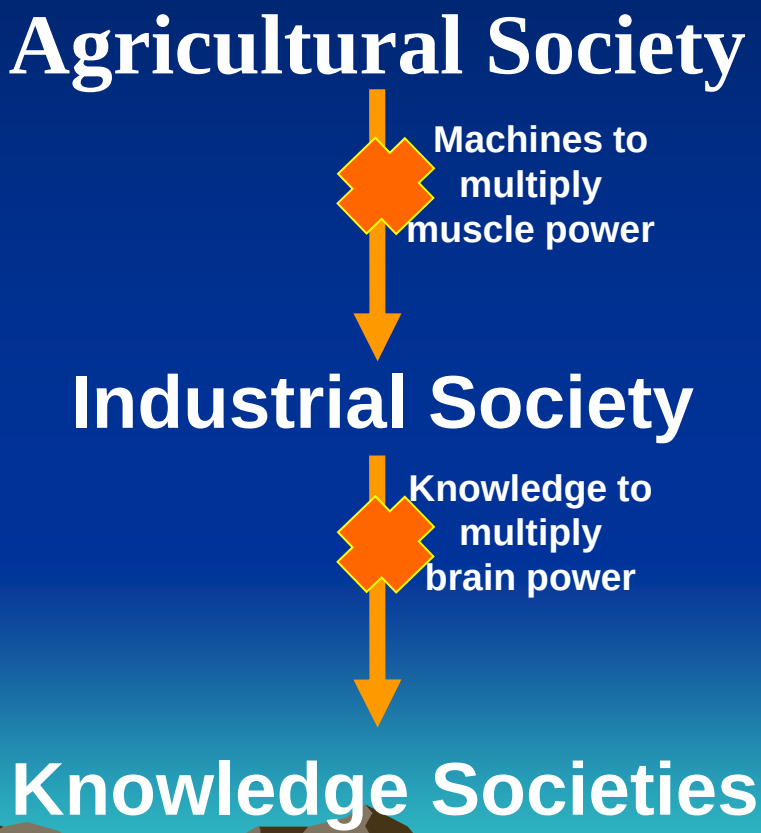


# MDGs and Knowledge - *Adopted from UNESCO*

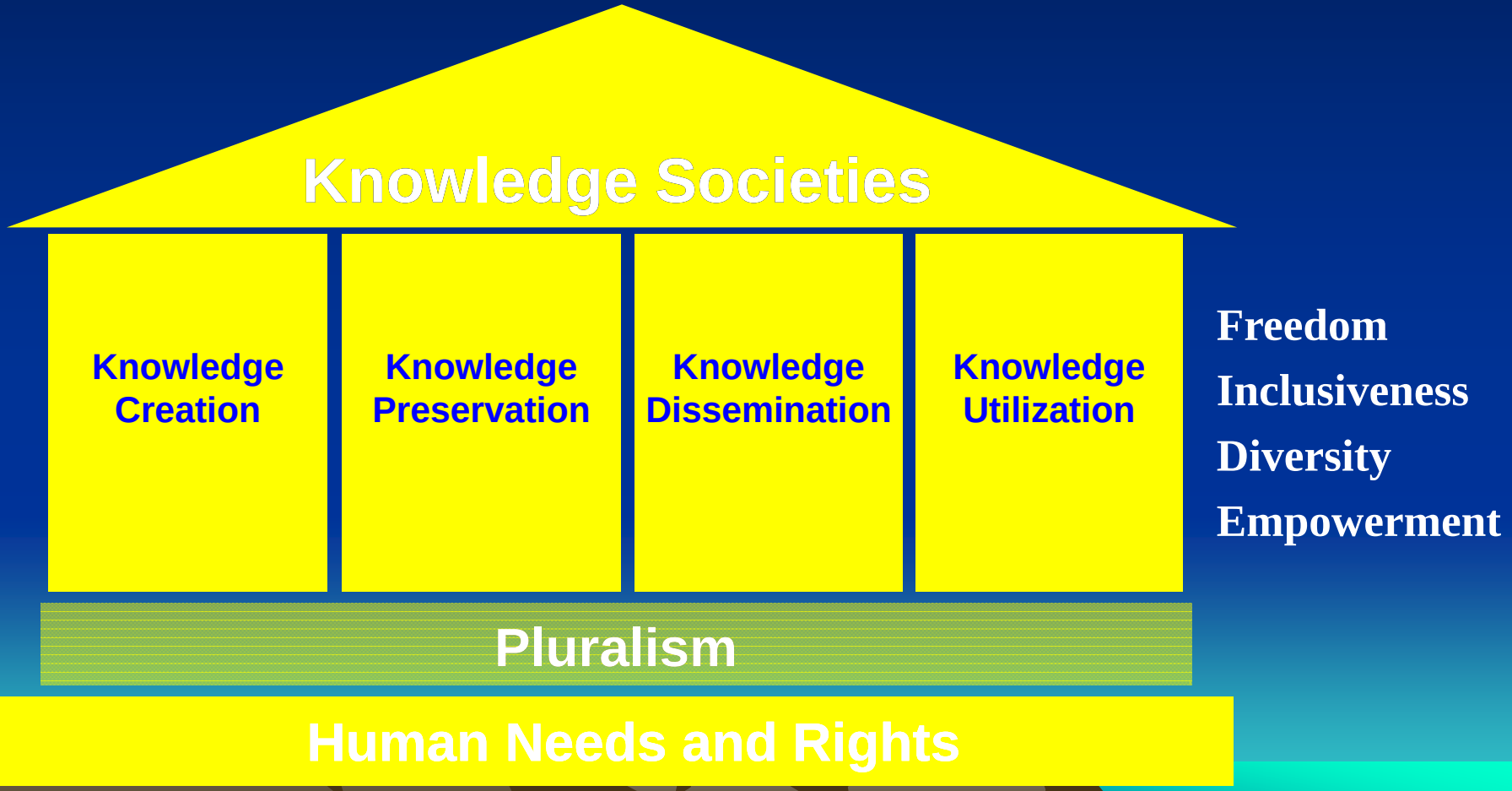


## Social transformation - *Adopted from UNESCO*

"Half a hectare of land and one year of labour were required to feed one person in 1900; whereas that same half-hectare now feeds 10 persons on the basis of just one and a half days of labor".



# UNESCO's concept of Knowledge Societies



- **A knowledge society creates, shares and uses knowledge for the prosperity and well being of its people. [1]**

# 2.0. ICT AS TOOLS OF KNOWLEDGE

- **Major advances towards convergence of computer, broadcasting and telecommunication technologies is now referred as Information and Communication Technologies (ICT).**
- **ICT are used to facilitate the processing, transmission and management of information and knowledge. As an intermediate good or product, the value of information and knowledge in use varies dramatically depending upon the context.**
- **It would seem logical to conclude that better access to a resource as basic as *information* and *knowledge* would greatly improve standards of living of the people. However it is very difficult to provide solid empirical evidence to support this conclusion.**

- **ICT play a prominent role in the broader conception of human development. They often new channels for the virtual spaces for social communication thus educating and empowering people.**
- **All sectors and area related to human activity and development (education, health, agriculture, governance, environment etc) benefit a lot in the use and application of ICT.**
- **A critical knowledge is to promote an enabling environment for harnessing the potential of ICT for the benefit of all.**

- **Left to itself, technology is a great divider. It favors those who adopt it early at the cost of those who come in late.**

# 3.0. ICT IN EDUCATION

## Table 1. Skills Needed in the Workplace of the Future

Source: Adapted from EnGauge. North Central Regional Educational Laboratory. Available Online at http://www.ncrel.org/engauge/skills/21skills.htm. Accessed 31 May 2002. Adopted from ICT in Education by Victoria L. Tinio

| Digital Age Literacy | |
|---|---|
| Functional literacy | Ability to decipher meaning and express ideas in a range of media; this includes the use of images, graphics, video, charts and graphs or visual literacy |
| Scientific literacy | Understanding of both the theoretical and applied aspects of science and mathematics |
| Technological literacy | Competence in the use of information and communication technologies |
| Information literacy | Ability to find, evaluate and make appropriate use of information, including via the use of ICTs |
| Cultural literacy | Appreciation of the diversity of cultures |
| Global awareness | Understanding of how nations, corporations, and communities all over the world are interrelated |

| Inventive Thinking | |
|---|---|
| Adaptability | Ability to adapt and manage in a complex, interdependent world |
| Curiosity | Desire to know |
| Creativity | Ability to use imagination to create new things |
| Risk-taking | Ability to take risks |

| | |
|---|---|
| Higher-Order Thinking | Creative problem-solving and logical thinking that result in soundjudgments |

| Effective Communication | |
|---|---|
| Teaming | Ability to work in a team |
| Collaboration and interpersonal skills | Ability to interact smoothly and work effectively with others |
| Personal and social responsibility | Be accountable for the way they use ICTs and to learn to use ICTs for the public good |
| Interactive communication | Competence in conveying, transmitting, accessing and understanding information |
| High Productivity | Ability to prioritize, plan, and manage programs and projects to achieve the desired resultsAbility to apply what they learn in the classroom to real-life contexts to create relevant, high-quality products |

# Table 2. Overview of Pedagogy in the Industrial versus the Information Society

Source: Thijs, A., et al. Learning Through the Web Available Online http://www.decidenet.nl/Publications/ Web_Based_Learning.pdf Accessed 31 May 2002. Adopted from ICT in Education by Victoria L. Tinio

| Aspect | Less ('traditional pedagogy') | More ('emerging pedagogy' for the information society) |
|---|---|---|
| Active | • Activities prescribed by teacher<br>• Whole class instruction<br>• Little variation in activities<br>• Pace determined by the programme | • Activities determined by learners<br>• Small groups<br>• Many different activities<br>• Pace determined by learners |
| Collaborative | • Individual<br>• Homogenous groups<br>• Everyone for him/herself | • Working in teams<br>• Heterogeneous groups<br>• Supporting each other |
| Creative | • Reproductive learning<br>• Apply known solutions to problems | • Productive learning<br>• Find new solutions to problems |
| Integrative | • No link between theory and practice<br>• Separate subjects<br>• Discipline-based<br>• Individual teachers | • Integrating theory and practice<br>• Relations between subjects<br>• Thematic<br>• Teams of teachers |
| Evaluative | • Teacher-directed<br>• Summative | •Student-directed<br>• Diagnostic |

- **The ultimate goal of incorporating ICT in education should be to improve or enhance quality of students education. It should not be teaching kids how to use a computer although that is important but rather make them see the connection between technology and its application. ICT as a tool rather than a class subject. [2]**

# 4.0. HOW CAN WE MAKE ICT SUPPORT LEARNING

- **Policies have to be developed that back the approach and veer in directions that promote the use of ICT as learning tools.**
- **Develop new pedagogies for integrating the use of the technology with the curriculum of other subjects using ICT for productivity rather than practice.**
- **Teachers need to be trained in a sustainable manner is not only ICT literacy but in ways in which ICT can be leveraged as learning tools.[3]**

# 5.0. POTENTIALS OF ICT IN EDUCATION

- **Expanding Access to education both formal and non-formal to underserved communities, scattered and rural populations, and marginalised. The ability of ICT to transcend time and space means that education can be delivered any time anywhere. Also teachers and learners no longer have to rely on books as they now can have access to remote learning resources.[4]**
- **Preparing current generation of students for a workplace where ICT are becoming more and more ubiquitous.**

- **Improving the quality of education and training by:-**

  ➢ **Increase learner motivation and engagement – videos television and multimedia computer software that combine text, sound and colorful images provide content that engage students in the learning process. Likewise, radio and computers with internet, make use of sound effects that increase listening capacity and motivation in connecting with real people in world events.**

  ➢ **Acquisition of basic skills- though drills and practice ICT can facilitate the transmission of basic skills and creativity that are the foundation of higher order thinking. Most of early users of computers were for this purpose.**

- **Enhance teacher training – offering self directed, self paced Web- based course for school teachers. Training can also be radio and television based, satellite based either one way and two way. Teachers may also interact with remote lectures by telephone and fax. [5]**

- **Transforming the learning environment into one that is learner – centered. If designed and implemented properly ICT –supported education can promote the acquisition of knowledge and skills that empower students for lifelong learning. The promote both active and collaborative learning; Creative and Integrative learning where artificial separation of knowledge is eliminated; and Evaluative learning where leaner's explore and discover rather than listen and remembers.**

# 6.0. TECHNOLOGIES AND THEIR USES

- **Link broad goals to the choice of technology to be used and their modalities of use.**
- **Levels of technology use in education include:-**

  **Presentation, demonstration, drill and practice, interaction and collaboration. [6]**
- **Different ICTs include print, audio/video cassettes, radio and TV broadcasts, computers or the internet.**
- **Each of the different ICTs may be used for Presentation and demonstration (basic of all levels). Drills and practice may be performed using all ICTs with exception of video technology. Networked computers and the Internet enable interactive and collaborative learning.**

- **Radio and TV – educational tools since 1920s and 1950s respectively can be used for direct class teaching, school broadcasting and general educational programming over community. [7]**
- **Teleconferencing which include audio conferencing, audio-graphic conferencing, video conferencing and Web- based conferencing . Covers interactive electronic communication among people located at two or more different places.**
- **Computers and the internet – where we *learn about* computers and the Internet as the end goal; *learning with* computers and the internet in which technology facilitates learning across curriculum; and *learning through* computers and the Internet integrating technology skills development with curriculum applications. [8]**

# 7.0. CHALLENGES OF ICT IN EDUCATION

- There is no one formula for determining the optimal level of ICT integration in the educational system.
- Clear and specific objectives; resource mobilization and political commitment at all levels.
- Current institutional practices and arrangements including curriculum and pedalogy, language, capacity building content and financing.
- The understanding of the potentials of different ICT by educational policy makers and planners.
- Stakeholders identification and harmonization of efforts across different groups.

- **Infrastructure-related challenges such as buildings, reliable power supply, telecommunication, etc.**
- **Competencies must be developed targeting teachers, education administrators who provide leadership in ICT integration, technical support specialists, content developers.**
- **Financing where suggestions include grants, public subsidies, donations, community support, membership, business income, private-public sector partnership, etc. To ensure sustainability, government support and local community mobilization should be the strategy.**

- **It is not the technology but how you use it.”How you use technology is more important than if you use it at all”. Technology should not drive education, rather educational goal and needs must drive technology use. [9]**

# 8.0. CONCLUSION

- **ICTs cannot by themselves resolve educational problems in the developing world, as such problems are rooted in well entrenched issues of poverty, social inequality and uneven development. What ICTs as educational tools can do is enable developing countries to expand access to and raise the quality of education.**

Does studying annoy you?

Not them!

Someone got you Adidas instead of Nike?

They only have one brand!

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# PROJECT PROFILE 1

***Impact Assessment of ICT Project in Education in Tanzania - The Case of The National Examination Council in Dissemination of Examination Results***

**By**
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# 1.0 INTRODUCTION

- **National ICT Policy was adopted in 2003**
  - **Expand and develop the teaching of ICT at all levels of education**
  - **Use ICT to improve the quality of delivery of education**
- **ICT Policy for Basic Education**
  - **The Mission is to integrate ICT to enhance access, quality and management of basic education.**
- **Some ICT Projects in education are being implemented**
  - **ICT in all Teachers Training Colleges – funded by SIDA**
  - **eSchool Project**
  - **elearning projects at Universities**
  - **ICT in teaching/learning for science & mathematics**

- **The National Examination Council of Tanzania (NECTA) is among the few educational institutions that have applied ICT in their operations.**

- **No impact assessment study on ICT in Education has been conducted so far.**

- **Some impact studies have been conducted in other areas:**
  - **Impact of ICT on rural livelihoods in Tanzania and Mozambique (Report of DFID KaR Project 8347)**

# 2.0 THE STUDY

- For the purpose of this workshop, a crude study on impact of ICT in the educational sector, has been conducted at NECTA with limited time and resources.
- The study was supported by Tanzania Commission for Science and Technology (COSTECH) and NECTA.
- Did not follow all the guidelines, although it reflects the situation and may provide a basis for a systematic and detailed study in the future if resources are provided.
- Methodology used was face to face interviews and physical observations.

# 3.0 NECTA

## 3.1 What it is

- **The National Examinations Council of Tanzania (NECTA) is an institution which was established by the Parliamentary Act. No. 21 of 1973.**

- **NECTA is the agency for providing fair, efficient and effective national examinations and educational assessment systems.**

# 3.2 Examinations Administered

- **School Examinations**
  - **Primary School Leaving Examinations**
  - **Qualifying Tests**
  - **Certificate of Secondary Education Examination (O- Level).**
  - **Advanced Certificate of Secondary Education Examination (A-Level).**
- **Professional Examinations**
  - **Diploma in Education Examination**
  - **Grade A Teachers Certificate Examination**

- **Technical Examinations**

  - **General Certificate of Engineering Examination**
  - **Technical Certificate Examination**
  - **Full Technician Certificate Examination (FTCE)**
  - **Advanced Diploma in Engineering Examination**

## 3.3 Number of examinations and candidates

- **The total number of examinations administered by the Council has grown from 5 in 1971 to 14 in 2006**
- **The total number of candidates has grown from 84,624 in 1971 to 562,916 in 2004 and 904,172 in 2006**

# 4.0 TRENDS IN ICT USE

## 4.1 Pre – 1988

- Prior to 1988 Examination, results were hand coded and stored in paper files. Examination results were then typed using special fonts styles and duplicated for distribution.

## 4.2 Post 1988 – 2005

- Since 1988, NECTA started using WANG system (mainframe) for processing and storage of examination results and generation of reports.
- In year 2000, Centralized Clients Server System (Networked Personal Computers) was acquired and installed.

## 4.3 Currently

- In 2006 a database system was implemented for storage of candidate information, continuous assessment data and final examination results.
- Client – server system with modern system software, Optical Mark Readers (OMR) in use .
- Employed IT staff to implement the system and databases
  - 5 Programmers (2 with Masters, 3 graduates), 3 System Administrators (graduates), 7 Data operators and technician.
- Web publishing of examination results with searchable databases.
- Mobile phone dissemination (SMS).

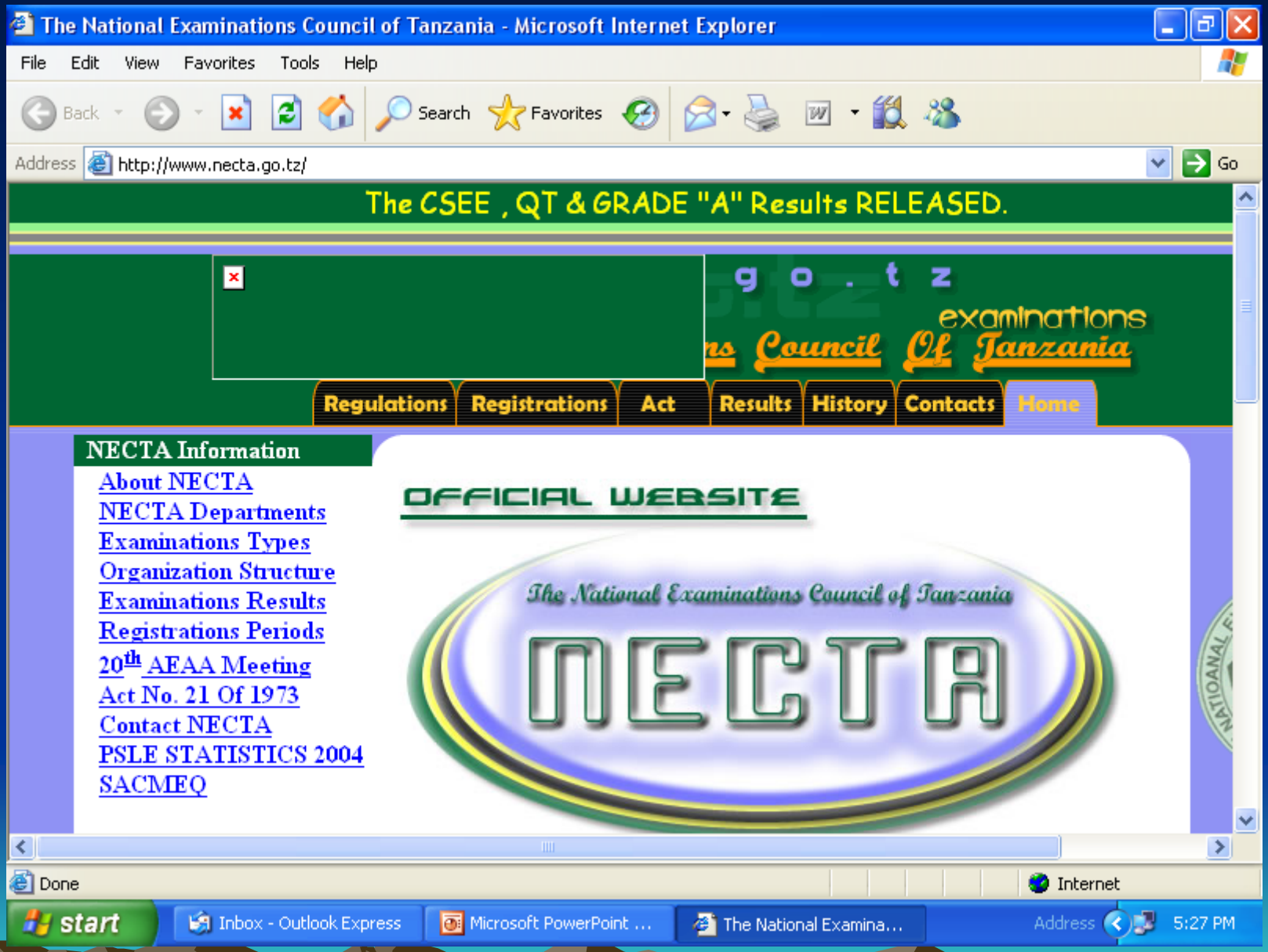
# 5.0 TRENDS IN DISSEMINATION

## 5.1 Prior to 2005

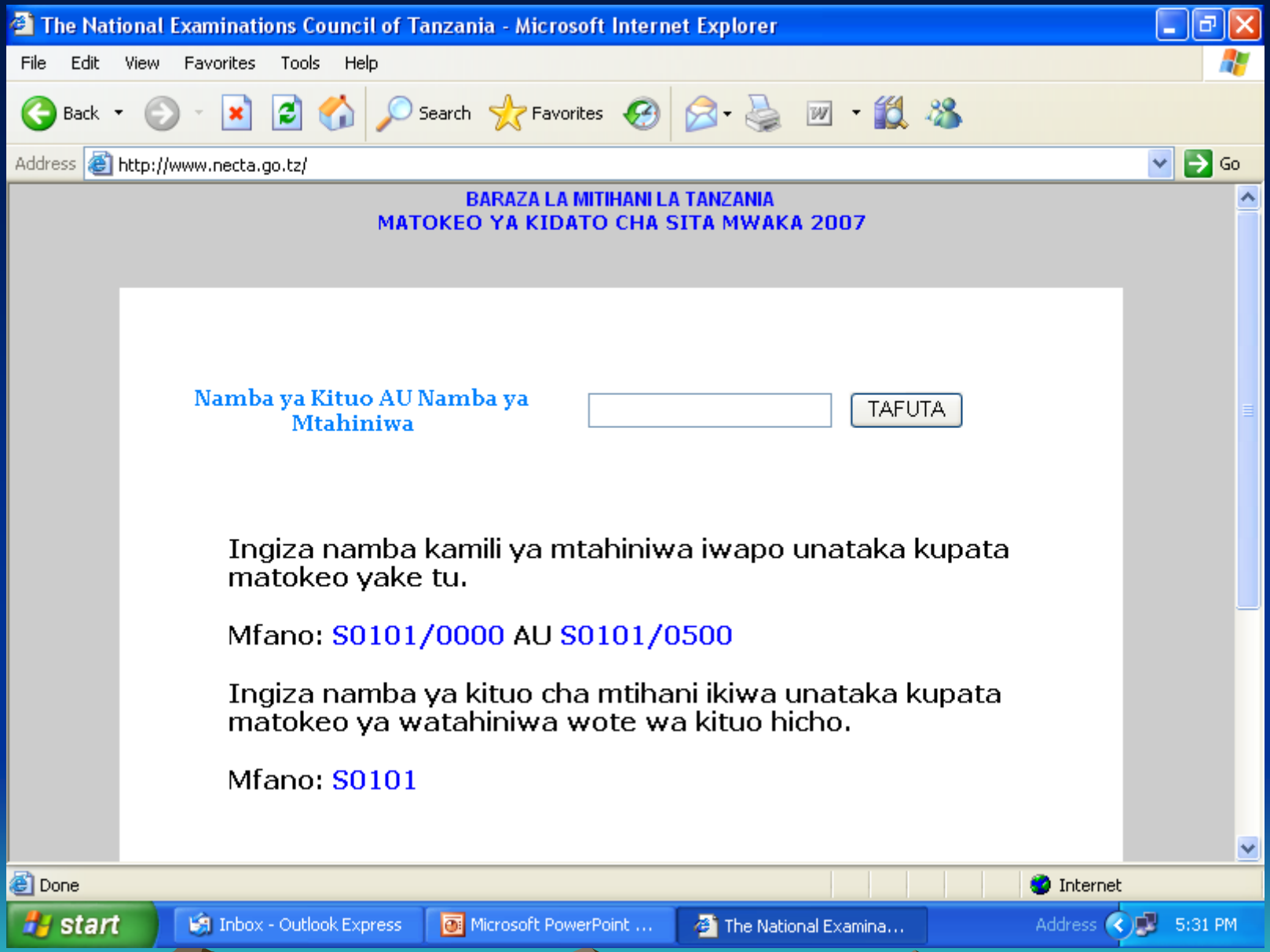
- Results consisting of a set of 17 books of 400 pages each were distributed to all schools and Regional Education Offices. Thousand of copies made.

## 5.2 After 2005

- Results are published on the Web.
  - http://www.necta.go.tz
  - Results were published on the Web as flat HTML files. Now they are in database format and are accessible through Internet and are searchable using mobile phones that support Internet connectivity.




Screen Shot of NECTA Website




# The Search Window

- **Results slips are printed from the system.**
  **Candidates can obtain result slips on the same day.**
  **2500 to 3000 slips are printed a day.**
- **In 2006, requesting of results through mobile phone (sms) was introduced as pilot. It is currently provided by a private operator who involves mobile phone companies. Request are made by sending an sms to the centre indicating examination number and results are sent back by sms. A fee of TShs. 500 (US$ 0.40) is charged via the mobile telephone operator.**
- **Results in CDs are provided to newspapers, Corporate users (Universities, Ministry of Education), NGOs; who in turn publish them or reload them on their websites –**
  ***Eg. www.tanedu.org***

# 6.0 VOLUME OF USE

## 6.1 NECTA monitored

- The server at NECTA was initially set to handle 500 concurrent requests on its database. This jammed and proved to be too low. The setting has now been adjusted to handle 1000 concurrent requests.
- About 160,000 hits per day are observed during early days of examination release. This shows that people are using the service.
- When the server is down, there are lots of phone calls made to the Council.

# 6.2 Users response

- **Out of 100 Advanced Level candidates interviewed**

  - **60 got their results through the Web by using public access points**
  - **20 got their results through mobile phone sms**
  - **15 visited centres to see results in printed books**
  - **5 come from rural areas where there is limited Internet access. These received their results by telephone from friends/relatives (in town) who used the Web to search on their behalf.**

# 7.0 IMPACT OF THE TECHNOLOGY

## 7.1 NECTA

- **Effective utilisation of manpower.**
  - ➢ **Prior to the application of Technology, NECTA had to hire additional (temporary) staff to assist in Data Entry and Processing of Examinations. Currently only NECTA permanent staff handle the task and without working overtimes. Use of Optical Mark Reader System.**
- **Reduced cost of paper as most people access results through the Web.**
  - ➢ **For the Ordinary Level Examination results a set 17 book of 400 pages each were prepared. Initially, such a set was sent to each school and Regional Education Offices. More than 1000 sets were made. Currently sets of results are sent to 25 Regional Offices only.**

- **Faster processing time**
  - **In 1985 they were 21,765 candidates for Ordinary Level Examination. It took 3 months to process this examination. In 2006 with 147,609 candidates, it has taken only 5 weeks to process similar examination results.**

## 7.2 Students/parents

- **Reduced waiting time for results**
  - **Reports/results available within a shorter period. From 3 months in 1985 to 5 weeks in 2006.**
- **Immediate access to results as soon as they are released.**

- **Early release of Examination results has enabled candidates to join Colleges without delay.**
  - **The Ministry of Education has been able to schedule Form V classes to begin in February (starting this year) instead of July in previous years.**
  - **Form Six graduates can now enter Universities directly.**
- **Improved Access to Examination Results**
  - **Reduced cost for students, parents, teachers in terms of transport to results centres**
  - **Time saving – Results available anywhere anytime**
  - **Decent way of viewing and getting results**

# 7.3 Other Players

- **The University of Dar es Salaam receives a copy of Results in soft format and use to validate grades submitted by applicants (cross-checking). Has reduced cheating and faking certificates.**

# 8.0 WHAT FUTURE

- **More online transactions need to be implemented.**
  - **e-ordering of Results Slips**
  - **e-Registration of candidates**
  - **Adopting the sms service by NECTA or fully subcontracting to more intermediaries**

# 9.0 CONCLUSION

- **ICT has enabled NECTA to work more efficiently and thus fulfill its mission of providing fair, efficient and effective national examinations and educational assessment systems in Tanzania.**
- **ICT has also made it possible for students to continue to A level studies (from O-level) and to join universities and colleges without long delays (6 months and one year).**
- **More impact will be seen as the system continue to be improved.**
- **Up to this point, there are positive signs that ICT is a key enabler if effectively utilised.**
- **Major impact assessment studies should be supported in the future to have concrete empirical evidences.**

# END

**Thank you**

***Asanteni Sana***

# PROJECT PROFILE 2

**Distance Education for Secondary Schools-Tanzania.**

***www.iicd.org/projects/tanzania***

- **In Tanzania, there is a lack of teaching and learning materials. The organization Distance Learning and Education Services (DILES) set up and supported by IICD of the Netherlands in 2000 deals with this lack by providing all kinds of online and offline educational resources. *www.diles.or.tz***
- **The project objective is to deliver quality Educational Materials at lowest price possible using the Internet and other ICT technologies.**

- **More than 500 rural schools and 78 schools in the city have made use of services. About 250,000 students have benefited from materials produced by DILES.**
- **Certification of provided materials was very cumbersome. Updating of materials was not easy. Teachers consider DILES as their competitor as they also top up their income by selling notes and other materials.**
- **Sustainability of DILES is still difficult.**

Unwin argues, ICT4D is ICT with moral agenda. A focus on needs, designing appropriate technological solutions, sustainability, vision and commitment, infrastructure, effective partnerships, monitoring and evaluation and accessibility are the key ingredients to a successful ICT4D initiative, according to Unwin. To date, this is the latest, one of the very few books with a global coverage of best ICT4D practices, and one that reflects much on what ICT can do for development. This book is edited by Tim Unwin, the UNESCO Chair on Information and Communication Technology for Development.