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FOREWORD

Information and Communication Technology (ICT) can contribute to universal access to education, equity in education, the delivery of quality learning and teaching, teachers' professional development and more efficient education management, governance and administration. While the introduction of Personal Computers into the school systems and the building of school networks are happening all over Africa, use of digital learning content in schools and colleges is rapidly increasing world over.

Vision 2030 stipulates Kenya's goal to transform into a globally competitive and prosperous nation with a high quality of life in all the three pillars (Social, Economic and Political). The power of digital learning is a contemporary global concern and the success of education depends on the collective ability to close the gap between technology's mere presence and its effective integration into the curriculum to enhance students' performance and deliver the skills necessary for the 21st century. This is also stipulated in the Sessional Paper No. 14 of 2012 that states that education shall be transformed to meet the 21st century needs for education and training through equipping the labour force with the requisite skills to participate and compete in the knowledge economy. Similarly, this will enhance the attainment of Kenya's education goals.

The use of computer in curriculum delivery in particular promises better and improved methods of educational content delivery, methodology and pedagogical skills as well as expanding the available teaching and learning knowledge base. Whereas technology cannot replace a teacher in the instructional process, it forms an important and additional resource for both the teacher and the learner, towards a more practical and learner-centred approach.

In an attempt to ensure ICT integration in teaching and learning in schools, the government has over the years invested heavily in the requisite ICT infrastructure. It is the expectation of the Ministry of Education Science and Technology (MoEST) that the current and future interventions will inject the much needed infrastructure, skills and attitude necessary to spur ICT integration for teaching and learning in our schools. It is important that teachers put a deliberate effort to acquire basic ICT skills as well as enhance their capacity in the area of ICT integration. This will greatly improve their service delivery in the teaching / learning process.

This Training Manual has been developed to assist facilitators who will train teachers for ICT integration in teaching and learning. It provides hands on experiences for all teachers regardless of competencies in ICT. It is therefore imperative that facilitators acquit themselves with the contents of this manual in order to effectively guide the teachers in this endeavour.

PROF. PETER ERASTUS KINYANJUI
CHAIRMAN COUNCIL
KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

ACKNOWLEDGEMENT

This training manual has been developed to help facilitators prepare teachers for the roll out of the national ICT integration laptop programme in primary schools. The Kenya Institute of Curriculum Development (KICD) wishes to acknowledge the collaborative effort made by various stakeholders to enable the realisation and the completion of this training manual. We wish to sincerely thank Microsoft for their technical and financial assistance. The Teachers Service Commission's (TSC) role in the development is highly appreciated.

The Institute also recognises the contribution of the writing team whose membership was drawn from various institutions such as TSC, Ministry of Education Science and Technology (MoEST) (ICT4E and NI3C), Kenya Education Management Institute (KEMI) and Centre for Mathematics, Science and Technology Education in Africa (CEMASTEA), INTEL and KICD. Their invaluable input towards the successful completion of the manual is highly appreciated.

DR. LYDIA N. NZOMO OGW
DIRECTOR/CEO
KENYA INSTITUTE OF CURRICULUM DEVELOMENT

OBJECTIVES OF THE TRAINING MANUAL

By the end of the training the participant should be able to:

1. Apply change management strategies in embracing ICTs in their work
2. Facilitate and inspire innovative learning and creativity.
3. Create and manage an effective ICT integrated learning environment.
4. Engage in monitoring and evaluation of ongoing ICT integration programmes.
5. Appreciate the role ICTs play in day to day lives.
6. Sustain virtual collaborations with peers on educational environments.
7. Engage in professional development and model ethical responsibilities.

ABOUT THE MANUAL

About the Manual

This training manual has been developed to guide trainers in training education implementers to integrate ICTs in primary education. The guide outlines the knowledge, skills and attitudes to be acquired in preparation for integrating ICTs in schools. The training manual is organized in three modules namely;

a) Education leaders' training

b) Basis ICT skills, internet use, maintenance, safety, security and ethics

c) ICT integration in teaching and learning

Education leaders' training targets education managers who include, County Directors of education, District Education officers, Quality Assurance officers, Head teachers and TAC tutors. Basis ICT skills, internet use, maintenance, safety, security and ethics, as well as ICT integration in teaching and learning is developed for teachers. It is envisaged that at the end of the training, all the participants will adapt contemporary technology and apply it in their day to day teaching/learning activities.

How to use the Manual

The Manual has three (3) broad modules which consist of several sub-modules. Each sub-module has a topic, objectives, content and activities. In the introduction, the manual contains the resources, methodologies and assessment. There are references at the end of the manual that the trainers can refer to for additional information. It also provides a number of experiential activities that the trainer can use during the training.

Methodology/ Activities

This manual is more practical oriented than theory thus trainers should use a variety of participatory methods so as to involve the participants. It is important to note that participants also have important contributions in the learning process, drawn from their varied experiences. This manual provides suggested activities that can be carried out using various methodologies. Some of the methods include:

- **Discussion** – This is usually best done in groups where the participants engage in an interactive and explorative talk as they analyze, review or evaluate a specific topic/ subject. The group should not be too large so as to allow for general participation. It is important to have a leader moderating the discussion and ensure that the more vocal members do not dominate the discussion.
- **Buzzing** – Participants consultant in twos or threes where they share views on a raised issue and then the views are shared in a large group and a consensus reached.
- **Plenary** – This is where the entire group is involved in a discussion guided by the facilitator/ trainer.
- **Role Play** – involves a small, often unrehearsed drama where participants are given the area they are supposed to act. People assume roles of others.
- **Brainstorming** – This is a technique of gathering ideas from a group of people assembled in a meeting. It encourages active and imaginative input from participants and taps the knowledge

and expertise of the participants. The facilitator's role is to encourage all participants to give ideas and opinions. All ideas are recorded and the information collected is analyzed.

- **Case Study** – A situation complete with issues that actually happened (or imaginative) is given. Participants are presented with the situation describing an event relevant to the topic. Some problems are given and participants are to suggest solutions.
- **Focus Group Discussion** – Involves a small group of informants (6-12) guided by a facilitator or moderator who talk freely and spontaneously about their common problems or ideas and come up with recommendations. A notes taker records the deliberations. A tape recorder may be used to be able to get all the information.
- **Story Telling** – The trainer, facilitator or learner narrates a story, episode or event. The narrated story must be simple, short and relevant to the subject matter. The learners should be able to deduce the teaching from the story.
- **Demonstration** – Teaching by showing/doing as well as by telling. Learners learn by observing and sometimes practicing the skills, processes or functions demonstrated in action. A demonstration may be carried out after a lecture, discussion or explanation. The trainer should explain the purpose of the demonstration and allow participants to practice what has been demonstrated.
- **Question and Answer**: The trainer asks the participants a question(s) on a particular topic and they answer the question(s) based on their understanding. This may sometimes lead to a discussion on the topic.
- **Video clip** – This should be selected based on the topic being taught. A brief summary of the video clip should be given to the participants before viewing. The viewing should be followed by either a discussion or questions and answers.
- **Practical tasks**: The participants are given some instructions to carry out an activity practically (hands-on). Sometimes the activity has to be demonstrated first e.g. an experiment.

RESOURCES

The following are some resources that the trainer can use during the training:

- Video clips
- Flip chart
- Computers
- White board
- Projector
- Marker pens
- LCD projector
- Reference books/ manuals
- Internet/ online resources
- Resource persons
- Journals
- ICT hardware devices
- Printer

Assessment Methods

The trainer can use a variety of assessment methods such as:

- Assignments (take away)
- Oral assessment
- Practical assessment
- Micro-teaching

Module One

EDUCATION LEADERS TRAINING

Sub module 1: Overview of ICTs in Education

Introduction

Information Communication Technologies (ICTs) in teaching and learning are technological tools in form of hardware and software that help communicate, develop, disseminate, store and manage information. These technologies include computers, the internet, broadcasting technologies (radio and television), and (mobile) telephony. It can be hardware (such as computers, digital cameras), software (such as Excel, discussion forums), or both. Computers, laptops, internet, television and mobile phones are some of the ICT tools used in education to enhance the teaching learning process.

Information and Communication Technology (ICT) has the potential to play a powerful role in increasing resources and improving the learning environment. ICT plays a role in equipping learners with fundamental skills and competencies to enhance competitiveness in the emerging global "knowledge" economy (National ICT Strategy, 2006).

It is now globally accepted that quality education should provide 21st century skills that include, learning and innovation skills (Creativity and Innovation, Critical Thinking And Problem-solving, Collaboration, Communication) Information, Media And Technology skills(Information Literacy, Social Responsibility and ICT Literacy skills) and Life and Career skills (Flexibility And Adaptability, Initiative and self drive, Social and cross cutting skills, Productivity and Accountability and Leadership and Responsibility).

The East African Community members have formulated national ICT policies. In these policies for education, the East African countries express the need for integrating ICT in both formal and informal education and most of them have drawn out plans for ICT integration in their schools.

In Kenya, ICT integration in the education sector means the seamless integration of ICTs in teaching, learning and management across all levels of education. The vision of the Ministry of Education, Science and Technology (MoEST) is to facilitate ICT as a universal tool for education and training.

The MoEST policy framework on ICT integration in education is drawn from the following components:

- The National ICT policy (2006)
- MoET ICT Strategy
- Sessional paper No.14-2012
- Education Act of 2013
- TSC Act of 2012
- NESSP, 2013 - 2018

(Course Participants can refer to the documents during their free time)

Goal of the manual: To improve the quality of teaching and learning in the classroom through the integration ICT.

Objectives

a. Create a common understanding of ICT integration in teaching and learning
b. Capacity build teachers and educational managers in practical ICT integration skills
c. Build a sustainable community of practitioners on ICT integration
d. Promote 21st century skills in teaching and learning

The manual has three modules each of which is comprises of the following: title, sub module, objectives, specific objectives, introduction, content, activities and a summary.

Security

Security for the ICT resources within the school is about protecting the infrastructure and school data from harm or accidental destruction. Possible threats to ICT include accidents caused by natural disasters as well as loss and damage resulting from: theft, fraud, sabotage and spying. The threats to security may come from within and from outside the school. It is therefore important to ensure the safety against all these is maintained, whether by building strong rooms, using strong passwords for data security or by ensuring social, moral and ethical safety rules are set and adhered to.

In order to manage e-waste, learning institutions need to:

- Create awareness and conduct sensitization campaigns on responsible e-waste management
- Develop Memorandum of understandings (MOUs) with recycling companies for take-back, recycling and re-furbishing of e-waste.

Roles of different stakeholders

TSC/MOE County Directors, DEOs, District Staffing Officer

a) Supervise and co-ordinate the training of the teachers.

b) Co-ordinate the distribution of the hardware in the schools within their areas of jurisdiction.

c) Supervise and file progress reports on the implementation of the program.

d) Ensure that the funds sent to the schools are managed well and accounted for.

QA &SO, TAC Tutors & E A R C

- Supervising the implementation process.
- Monitoring and evaluation of the program.
- Ensuring that schools have developed an ICT policy and implementation plan and adhered to it.

Head Teachers and the School Management Boards

1) Ensure the teachers are trained and integrate ICT in teaching.
2) Ensure adherence to procedures during the procurement of LCD projectors and installation of LAN.
3) Account for all funds disbursed to the school under the program and ensure proper documentation kept at all stages.
4) Provide security and take responsibility for the servicing and maintenance of all the ICT infrastructure.
5) Ensure continuous development and improvement of content.

Trainers

- Training of teachers on ICT integration in the teaching and learning process.
- To provide support to the teachers.

'Future generations will thank us for the fight we are undertaking to promote ICT and ensure we have a world class workforce who can compete in a digital world.' …..Neil Turner

Sub Module 2: Managing and Leading Change

Introduction

This sub module is meant to impart competencies for change towards the introduction of ICT integration in the teaching and learning process. It covers the various changes brought about by ICT, the changing roles of the teacher, learners and factors leading to resistance to change. Managing change is about getting people on aboard and making them want to change. It involves creating an emotional connection to the change process and motivating the individuals to act differently. The responsibility of managing change lies with the management.

School managers have the responsibility of facilitation and enabling change as well as helping the rest of the staff members to understand the aims and ways of responding positively to embrace the new ways of doing something.

Specific objectives

By the end of this sub module unit the course participant should be able to:

a. Describe the various changes brought about by information communication technology in human lives
b. Explain the changing role of the teacher and the learner
c. Discuss the role of the head teacher as a change agent in the school
d. Discuss factors leading to resistance to use of ICTs in teaching and learning
e. Explain how the school head can overcome resistance to use of ICTs in teaching and learning
f. Explain the role of effective communication in the change process
g. Explain how the school leader can help the teachers deal with the phases of the change process.

Prior Knowledge task:

Lead the participants to discuss some of the significant changes that have taken place in the teaching learning process in the last ten years? List the key points.

Hint:

- Technological changes in information acquisition
- Pedagogical changes influenced by ICT
- Changes in communication of information

"Organisations will not change if people do not change," Toby Elwin.

A. Technological Changes Brought About by ICTs in Human Lives

Over the past two decades, technology has become widespread and transformed lives. Some of the changes brought about by ICT are:

Communication	Mobile telephony Social media Blue tooth
Dissemination	Information sharing using the internet and intranet
Storage	Greater capacity storage devices such as external storage devices (DVDs, flash disks, memory cards) and data centers.
Manage information	Tailor made applications to enhance communication, dissemination and storage of data.

B. Changing Roles of Teacher and The Learner

Traditionally, the role of a teacher in the teaching and learning process has been the transmitter of knowledge and skills while that of the learner has been that of the passive recipient. Technology has contributed to change of pedagogy from teacher centred to learner centred approaches.

Task 2

Lead the participants through an open discussion on the following:

- the approaches teachers use in teaching
- whether the approaches are teacher centred or learner centre.

This table compares the teacher centered and the learner centered approaches

Teacher-Centred Approaches	Learner-centred Approaches
CONTENT	
Learners have access to limited information, selected by the teacher or the school library.	Learners have infinite access to unlimited information of varying degrees of quality.
Teachers choose activities and provide materials at the appropriate level	Learners select from a variety of teacher provided activities and often determine their own level of challenge at which to work.
TEACHING AND LEARNING	
The teacher is the information giver - the sage on the stage - helping learners acquire skills and knowledge.	The teacher is the facilitator. The guide on the side providing opportunities for learners to apply skills and construct their own knowledge.
Learning starts with what learners do not know.	Learning starts with learners' previous knowledge.
CLASSROOM ENVIRONMENT	
Learners learn passively in an often silent classroom.	Classroom environment resembles an active workplace with various activities and levels of sound depending on the kind of work being done.
Learners usually work individually.	Learners often collaborate with peers, experts, community members, and teachers.
ASSESSMENT	
Teachers are primarily accountable for learning.	Teachers and learners share accountability for learning and achievement.
Learners are extrinsically motivated by the desire to get good grades, to please teachers, and to gain rewards.	Learners' interests and involvement promotes self- motivation and effort.
TECHNOLOGY	
Teachers use various kinds of technology to explain, demonstrate, and illustrate various topics.	Learners use various kinds of technology to conduct research, communicate, and create knowledge.

C. Role of a Head Teacher as a Change Agent

Task 3

Lead the participants in small group discussions on how a head teacher can demonstrate good leadership in the adoption of ICT in teaching and learning.

Group leaders to enumerate the issues raised and present in a plenary session.

Hint:

- Resource mobilisation for the acquisition of the necessary infrastructure
- Facilitate staff to acquire and use ICT skills in teaching and learning
- Making use of the ICT in teaching and management activities

As leader of the school, the head teacher envisions a better future and becomes an agent to make it possible by describing and pursuing strategies to achieve it. Effective leadership is a requirement for delivering any form of institutional change and embedding technology as a tool for whole school improvement.

D. Factors Leading to Resistance to Use of ICTs in Teaching and Learning

Change does not come automatically. There is always a possibility of resistance. But why do people resist change? Why would teachers resist the use of ICTs in teaching and learning?

Task 4

Form small groups and instruct participants to discuss why teachers would resist the adoption of technology in teaching and learning.

[Course participants to present feedback in plenary]

Hint:

- Fear
- Lack of Competence
- Poor Communication
- Lack of Information
- Benefits and Rewards
- Comfort Zone.

E. Overcoming resistance to the use of ICTs in teaching and learning

People are usually resistant to change even when they know that they need to change. School leadership should anticipate possible resistance and help the staff to overcome their fears in order to embrace change:

Task 5

Form small groups and guide them to discuss how stakeholders may be assisted to overcome resistance in order to embrace the use of ICT in the teaching and learning process.

[Course participants to present feedback in plenary]

Hint:

- Involve the teachers and stakeholders in the process
- Train the teachers
- Explain the change in an easy to understand terms
- Develop a shared vision and buy-in
- Explain the reasons why they need change
- Address the concerns to the stakeholders
- Communicate to the stakeholders and keep them informed
- Provide requisite resources.

F) Role of Effective Communication in the Change Process

Task 6

Guide the course participants to role play imaginary scenarios, where the following individuals are discussing ICT issues in the given contexts.

- DEO addressing head teachers in the District
- Head teacher addressing PTA in school
- Head teacher addressing staff members
- Head teacher addressing pupils

Participants are divided into groups. Each group assigned a role play. Members develop an outline (key points). Presentations done in the plenary.

Hints:

- Communicate the reasons for change
- Ensure audience understand the vision
- Address fears and concerns
- Explain the role of each audience in the change process.

Consider the 5 Ws

- **W**ho should be told – This is everyone who needs to know anything about change openness.
- **W**hen should they be told – It is important to inform everyone at the same time to avoid spread of rumours.
- **W**hat should they be told – Be clear on the plans and what is to happen and what is happening. That is the vision, the mission and the objectives of the change and make people understand how the changes will affect them.
- **W**here should the message be conveyed – Choose the best venue to relay the information.
- **W**ho should control the communication process – Consider the right person for this role and make the person available when possible to mingle with others in the work place.

G) Phases of the Change Process

The change process requires a period of adjustment before things stabilise The adjustment may sometimes be difficult having to do with depression, anxiety issues, panic attacks and codependency. The following are the seven phases of Lewin's model through which people perceive change.

Lewin's phases	Likely scenario in the integration of ICT
Phase 1 – Shock and surprise This is where people are confronted with expected situations realise their usual ways of doing things are no longer suitable for the new conditions	
Phase 2 – Denial and refusal People still believe change is not necessary.	
Phase 3 – Rational Understanding Here people realise the need for change and focus on long term solutions. However there is no willingness to change own patterns of behaviour.	
Phase 4 – Emotional Acceptance This is the crisis phase. The management creates a willingness to change, values, beliefs and behaviour and exploits the real potential.	
Phase 5 – Learning People start trying out new behaviour.	
Phase 6 – Realization More information is gathered and the knowledge acquired has a feedback – effects. People understand which behaviour is effective and open their minds to new experiences.	
Phase 7 – Integration People totally integrate their newly acquired patterns of thinking and activities as the new becomes a routine,	

Task 7

Lead a plenary discussion to contextualize the likely scenario in the specific phases of change during the implementation of the ICT for schools programme.

[Let the participants identify and complete the likely scenarios in the table]

Summary

Summary task

Case scenario

'You are the head teacher of ABZ primary school. Your school has received a donation of 50 laptops and other support equipment for the implementation of ICT integration.'

Highlight your strategies to ensure effective adoption of the technology in the teaching and learning process.

Sub module 3: Leading Effective Teaching and Innovative Learning Through ICT

Introduction

This sub-module will equip the course participants with skills to enable them lead effective and innovative teaching and learning through ICT to help them formulate and implement strategies for effective use of technology in teaching and learning. They will also be able to understand the role of ICTs in the acquisition of the 21st century skills and also acquire effective instructional supervisory skills that they can use to assess ICT integrated lessons.

Specific Objectives

By the end of the sub-module, the participants should be able to:

a. Explain the concept of ICT integration
b. Describe the benefits of ICT integration in teaching and learning
c. Explain the role of ICTs in the acquisition of the 21st century skills.
d. Discuss the role of the school head in facilitating ICT integration in teaching and learning.

A. The Concept of ICT Integration

Task 1

Divide the course participants into small groups of three to talk about the question:

What is ICT integration?

Guide the participants in discussing the question in groups of threes. They should give feedback during the plenary.

ICT integration refers to the use of ICT to enhance the teaching and learning process. It is used to engage learners in meaningful learning that translates into improved student performance. Effective ICT integration should focus on pedagogy design which takes into account the fact that teachers need to 'learn about technology … in the context of their subject matter and pedagogy' (Hughes 2004, p. 347). Additionally, ICT can support various types of interactions in the learning environment: learner-content, learner-learner, learner-teacher, and learner-interface.

B. Benefits of ICT in Teaching and Learning

Task 2

Put up a flip chart and ask each course participant to come and write one benefit of ICT in teaching and learning.

Hint

- Increases learners' motivation
- Holds learners' attention
- Allows learners to learn by doing
- Receiving immediate feedback
- Uses all the learners' senses
- Able to use new tools to master the key concepts and skills
- The option to select learning materials that meets their level of knowledge and interest
- Allow learners to work at their own pace
- Different learning styles are addressed
- Making abstract concepts clearer
- Reducing the risks involved in dangerous experiments and operations
- A reliable link to various information sources

C. The role of ICTs in the Acquisition of the 21st Century Skills

The 21st century skills are usually categorised into three broad groups namely:

1. **Learning and Innovation Skills:**
    - Creativity and innovation skills
    - Critical thinking and problem solving skills
    - Communication and collaboration skills
2. **Information, Media and Technology Skills:**
    - Information literacy
    - Media literacy
    - ICT literacy
3. **Life and Career Skills:**
    - Flexibility and adaptability
    - Initiative and self direction
    - Social and cross-cultural skills
    - Productivity and accountability
    - Leadership and responsibility

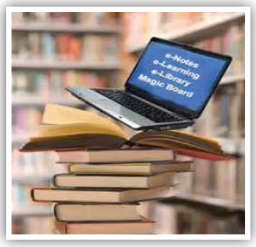
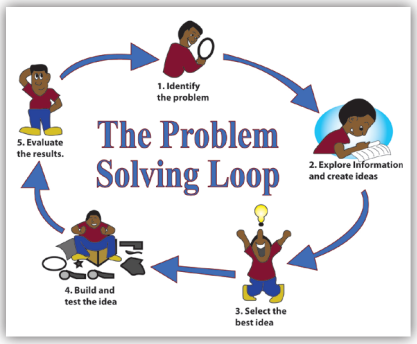
Task 3:

Divide the course participants into small groups.

Discuss the role of ICTs in the acquisition of the 21st Century Skills.

Hint: Refer to table below.

21st C skills (illustration)	Brief description
	**Demands of the labour market** Learners to learn how to integrate ICT into their learning and also in their daily lives

	**Tools for examination, calculation and analysis of information** ICT-enhanced learning provides a platform for student inquiry, analysis and construction of new information
	**Critical thinking** Needed to survive in a complex, highly technological knowledge
	**Creativity** Needed to survive in a complex, highly technological knowledge
	**Problem solving** Needed to survive in a complex, highly technological knowledge
	**Innovation** Needed to survive in a complex, highly technological knowledge

	**Rich digital environment** Information age dictates that learners have to be well prepared to adequately meet the demands of the new age
	**Capacity building of teachers** Allows teachers to play a central role since they are key intermediaries

D. Role of the School Head in Facilitating ICT Integration in Teaching and Learning

Task 4: Discussion

An ICT based NGO has donated 200 laptops to Tumaini Primary School. The Head teacher receives the laptops and locks them up in a safe room since the school has no computer lab.

Let the participants discuss the following in groups:

Questions

1) How will the Head teacher ensure that the teachers and pupils are ready to receive the laptops
2) What equipment/ facilities will he/she need to put in place to ensure smooth implementation?

Hint: The Head Teacher to ensure that teachers;

- have basic ICT skills
- are sensitized/ given orientation on the importance of integrating ICT
- promote school-based initiatives
- are given necessary technical support is available for the maintenance of the computers
- develop a school ICT policy
- influence use of ICTs
- ensure that the school timetable reflects the integration of ICT

It is important to note that, "An effective leader should take the lead and not just support the integration of ICT into teaching and learning (Kathryn Moyle 2006 Voices from the Profession)

E. Development of an ICT Integrated Lesson

Task 5

Show the course participants an integrated lesson (could be a video clip or power point presentation). In small groups allow the course participants to:

(i) Identify the features that are different from a traditional lesson.

(ii) Suggest what they would assess in an ICT integrated lesson.

An ICT integrated lesson should be as participatory as possible through the use of multimedia elements such as audio, videos, photographs, illustrations, animations and quizzes/ exercises.

When designing an ICT integration plan, the teacher-designers need to consider whether:

- The activities can promote learners' critical thinking or other higher order thinking.
- The learners understand what they are supposed to learn.
- The expectations and assessment criteria, such as rubrics, are stated clearly.
- There are opportunities for learners to take control over content, pace, and sequence.

F: Assessment of an ICT Integrated lesson

The assessment often reflects both the process and the product (Jonassen, 1991).

The assessment on the process examines how by using the ICT:

a) the learners complete the learning activities or tasks,
b) work together to complete the final product, or
c) construct knowledge collaboratively.

Methods used for the process assessment include writing online reflection journals, peer evaluation, or e-portfolios (Barret, 2006).

The assessment on the product aims at investigating the quality of the final outcome, such as solutions to the problem, or software programs developed.

Usually, there are two forms of assessment: ICT-based and non-ICT based.

(i) ICT based assessment:

- computer-based testing,
- multimedia program development,
- power point presentation,
- weblog writing, or
- concept map construction.

(ii) Non ICT based assessment involves writing a paper-based essay or a reflection journal, or answering short questions on paper.

After conducting the ICT integrated lessons, the teacher designers need to reflect upon their learning experiences of the ICT integration. The reflections can focus on the appropriateness of the technology used, strengths and weaknesses of the technology, possible improvement and also provide further suggestions on how other teachers can use the lessons for different target learners in different contexts. These suggestions may include alternative technology, instructional methods and activities, assessment approaches, and ways to improve the plan to answer the following questions:

- Are the major questions involved in the topic answered?
- Are the activities planned towards achieving the learning objectives?
- Does the technology support the instructional process?
- Is the rationale for using the technology sound?
- Can the implementation process be further improved?
- Are the methods for student assessment valid?
- How can we further the use of ICTs in the topic?

Summary

This sub module covered the benefits of ICTs in teaching and learning as well as their role in the acquisition of the 21st century skills. ICT integration is a comprehensive process of applying technology to the curriculum to improve teaching and learning. Its success depends not only on the availability of technology, but also heavily on the pedagogical design.

Other factors such as leadership, professional development, time, and evaluation also have a great impact on the effectiveness of ICT integration (Honey, Culp, & Carrigg, 2000).

Sub Module 4: ICT Vision, Policy and Implementation Plan

Introduction

This sub module will equip the course participants with skills to develop an ICT vision and implementation plan. It also aims to develop strategies to enhance ICT implementation in schools. The sub module covers the process of developing a school ICT vision and policy, strategies for ICT implementation, factors to consider in identifying development partners in ICT integration and training for teachers.

Specific objectives

By the end of this sub-module the participants should be able to;

a. Describe the process of developing a school ICT vision in tandem with the school vision.
b. Develop and share an ICT policy.
c. Demonstrate basic ICT skills.
d. Discuss strategies of organising staff to participate in the ICT implementation in school.
e. Discuss factors to consider in identifying ICT development partners
f. Plan an ICT training program for teachers

A. Development of an ICT Vision

ICT Vision

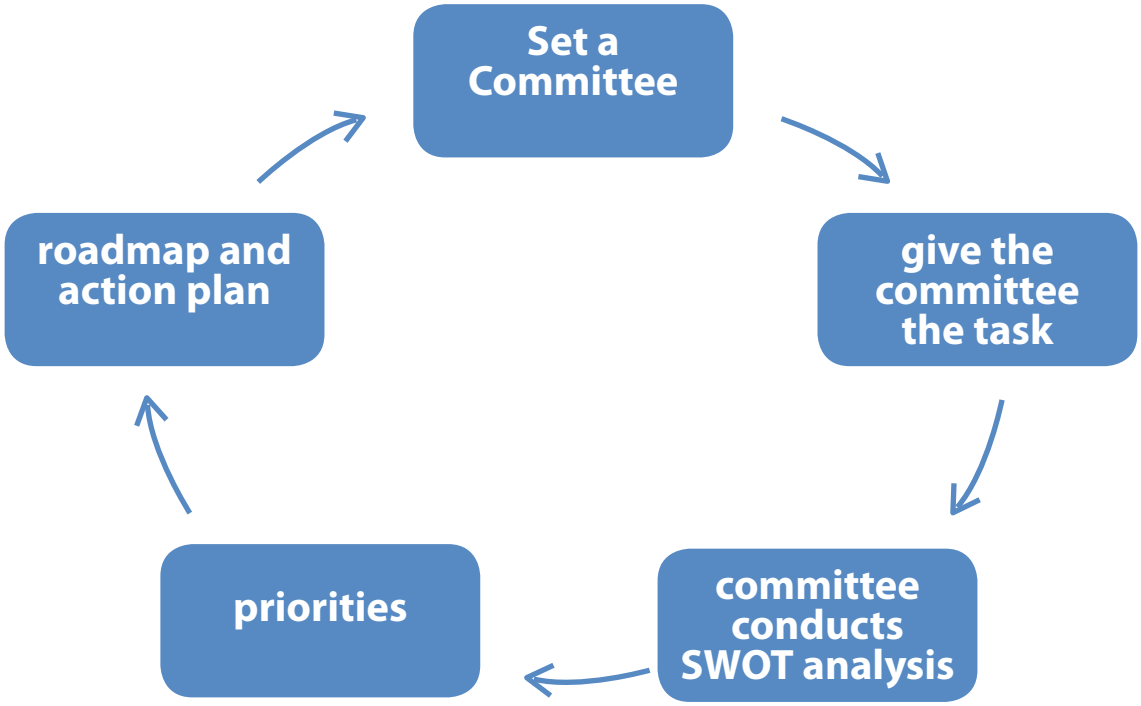
A vision is an achievable aspiration. It is where you want to go or to be in future. A school's ICT vision is a statement outlining its aspiration for integrating information communication technologies in the teaching learning process. It highlights what the school would want to do or become to enhance the ICT status.

B. ICT Policy

A policy is a course of action, framework or guiding principle. An ICT policy communicates the vision. It is a blue print or guide of the sequences or events a school will undertake to achieve ICT integration across the curriculum. A school ICT policy must be a concise and accessible document that informs and directs the integration of ICT within the school. It is important to have a school based ICT policy for successful integration.

Process of developing a school ICT policy

An ICT policy enables the school to design and manage ICT in a systematic way. The process of developing a school ICT policy involves the following five stages.



i) **Set a team** committee made up of relevant stakeholders such as teachers, SMC PTA representative, a sponsor, local authority representative.

Note: find out from participants other relevant personnel to include in the team

ii) This team should develop the school philosophy of integration. They should discuss the meaning of a school ICT vision and spell out how to generate an ICT vision.

iii) The team should assess the school **SWOT** (strengths, weaknesses, threats and opportunities)

iv) The team should deliberate on how ICT will be used in a school.

v) The team should decide who uses the ICT and the purpose for which it will be used.

Note: The SWOT analysis should be in line with their vision for ICT integration in teaching and learning.

ii) Decide on the priorities in the use of ICT for the school. This ought to include the following:

- What basic skills do teachers have?
- What training do they require?
- For how long should this training be?
- What infrastructure is needed?
- Which digital learning materials are required?

A **roadmap** is then formulated on use of ICT for T/L and compiled to a draft document. Compilation of the following information constitutes basic highlights of a school's ICT policy document.

- Who should manage the facility?
- Who accesses the ICT devices in the school?
- How will the school use ICT devices?
- What software will be availed in the computers?
- How will the computers be maintained?
- Who will provide technical support?
- How will the computers be stored and secured against theft and natural disasters?
- How will devices be guarded against vandalism, viruses, sabotage and misuse?
- How will the capacity building of staff be enhanced?
- How will the integrity in use of gadgets and information be ensured?
- What are the roles of the stakeholders (head teachers, teachers, parents, SMCs, PTA) in and outside the school?
- How will collaborative partners be identified?
- What strategies will be used to organize for staff to participate in ICT implementation?
- How will resource be mobilized and sustained?
- What are the financial implications?
- How will the programme be monitored and evaluated?

Task 1

The county director of education has requested all head teachers in the county to develop a draft policy document on the implementation of ICTs in their schools.

In small groups, let the participants develop a draft ICT policy and present it in plenary.
Note: The five stages in the development of the policy should be evident.

C Basic ICT skills

Introduction

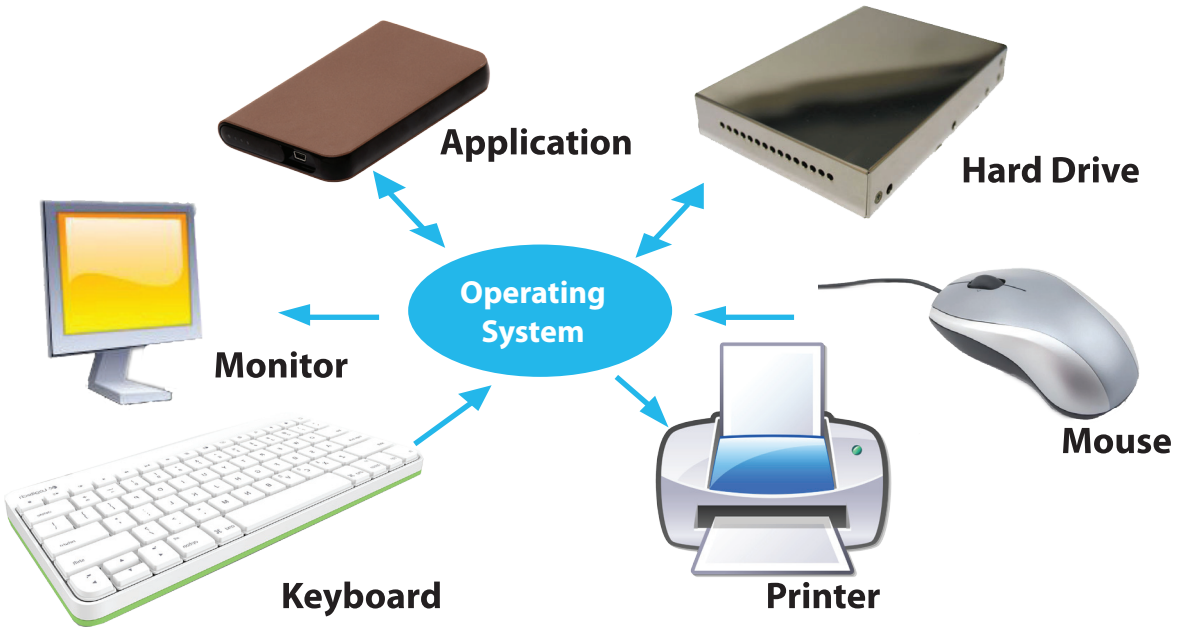
Since ICT has a range of devices that include: computer hardware, computer software, and telecommunications facilities, it is essential that the education leadership in a school set up understands some basic skills so that they are aware of what their teachers are under taking as they integrate the ICTs in teaching and learning. ICTs also include other computing devices ranging from handheld calculators to multimillion dollar super computers, display and projection devices used to view computer output, local area and wide area networks that allow computer systems and people to communicate with each

other, digital cameras, computer games, CDs, DVDs, cell telephones, telecommunication satellites, and fiber optics. However, this section will only cover basic ICT skills that the school leadership may require for administrative purposes.

Operating System

Basically an Operating system is low level software that enables a user and higher level application software to interact with a computer hardware, data and other programmes stored in a computer. The Operating System performs basic tasks, such as recognising input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as printers. The following is a figure of an operating system, and examples of peripheral devices it interacts with.

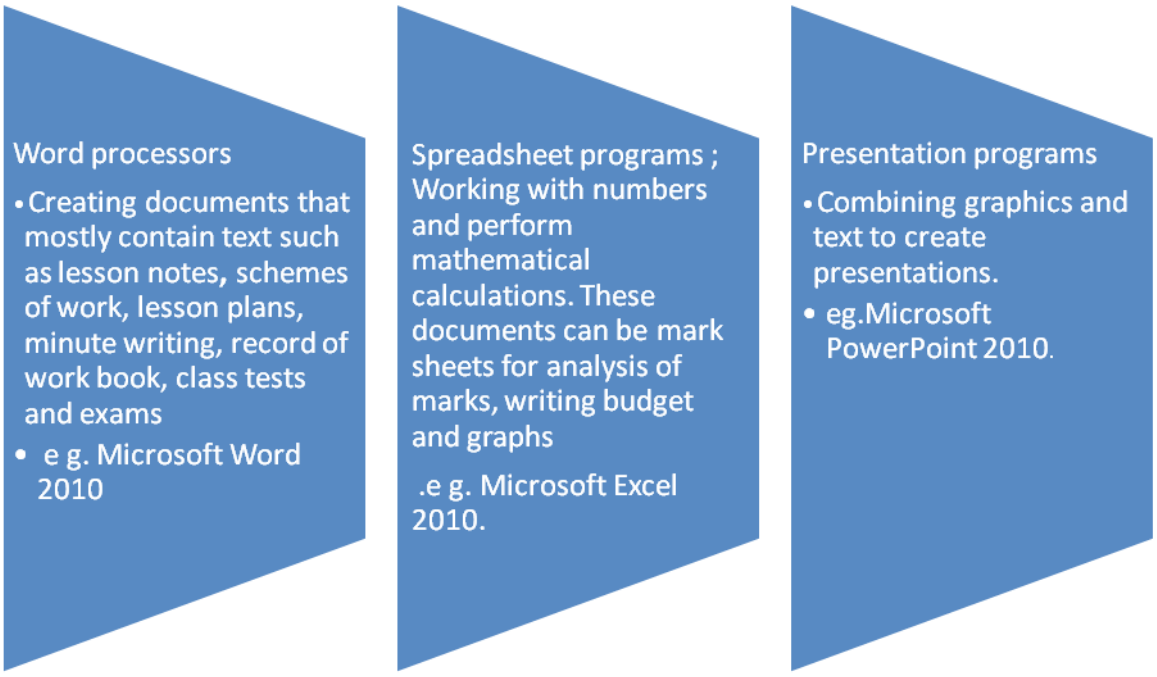
Working of the Operating System



Introduce the different devices of a computer to the participant and mention their use. These are : monitor, CPU, keyboard and mouse.

The computer programmes

One requires some basic skills in order to use application programmes such as word processors, spreadsheets and power point presentations. The use of each of programmes includes;



Word processor

This is a specialised programmes used to change the look and feel of a text document. It includes tools that help to create documents by inserting graphics, charts, tables, and other media elements. A word processor programme is also used to make notes, write examinations, stories, lesson plans etc.

Spread sheet

A spreadsheet application is a computer programme such as Microsoft Office Excel with a number of built in features and tools, such as functions, formulas, charts, and data analysis tools that make it easier to work with large amounts of data. The Excel software can be used to keep records of CATs and other tests. Teachers can discover the use of school management information systems that have record keeping facilities for assessment information.

PowerPoint

The PowerPoint software allows one to choose from several predesigned themes, or you can create your own. It has a variety of themes to create the desired look and feel for slides being presented.

Slides: slides are created. Text, graphics, images and sound can be applied to each slide to help convey a message to viewers. Display of the slides is done with a click as part of a timed show or cycle.

Animations and Transitions: The PowerPoint software allows additions of animations and transitions to the slide show.

Images and Graphics: Images and graphics help to communicate a message to the viewers of the slide show. For example, a chart made with Microsoft Excel can imported into your PowerPoint presentation simply by copying and pasting it into the appropriate space.

Task 1

Let participant be in suitable groups

1. Show them how to start the computer and open the three applications: one after the other; word processor, excel spreadsheet, and a power point.
2. On word, let them type a short message; eg. Notice of a staff meeting to the teachers in the school. This can be **edited, printed** and **saved** as a document on the computers.
3. On excel platform, let participants create a budget and calculate the total cost. They can create a pie chart to show the amounts as percentages
4. Let each group copy and paste the chart on power point and project their presentation during plenary for discussion.
5. Facilitator may go round the groups assisting those with diffuculty.

Other uses of computers

The email

The email has become a popular method of communication. It uses the internet which is a worldwide computer network, that interconnects computer networks across countries through the world wide web (WWW). The WWW provides internet users with a uniform and convenient means of accessing a wide variety of resources (pictures, text, data, sound, and video) available on the internet. An email can be accessed on a computer, a modem, mobile phone and other digital devices that have wireless connectivity.

Video conferencing

Video conferencing is a way of holding meetings when the attendees are not physically together in one location. One needs a webcam to capture the video, a microphone to capture the sound, video conferencing software and a high speed internet connection to handle the data transfer.

Collaboration and brainstorming tools- this is a wide ranging category of tools that include thought-organizing tools like mind mapping and collaborative tools like web based interactive white boards. Others tools that may be included in this list include wikis and virtual worlds.

Educational Online resources

Online resources refers to a wide range of information available on the internet including text, images, videos, cases studies, journals, databases and curriculum. There are many different digital formats for online resources including websites, audio and video podcasts, PDF files, e-books, interactive learning objects, digital tools for creating resources etc. All these can be used for research and sourcing for information

D: Implementation of ICT usage in schools

The ICT policy and vision should guide the school in implementing ICT integration. This will involve identifying an implementation team, setting priorities and developing an implementation plan.

Implementation team

This is a steering team which oversees the integration of ICT in the school. It is composed of key stakeholders in the school for creation of ownership and sustainability of the implementation plan.

Plan and priorities

The team should identify priority areas and develop strategies to ensure successful implementation. They should involve teachers to come up with a simple and manageable ICT training plan for the school. It should encourage staff to discuss their fears and concerns to the team.

Implementation plan

Teachers should be helped to overcome their fears by de mystifying the whole programme of computer use and integration. The innovation in the school should address what teachers believe in. Such discussions should be done regularly during staff meeting.

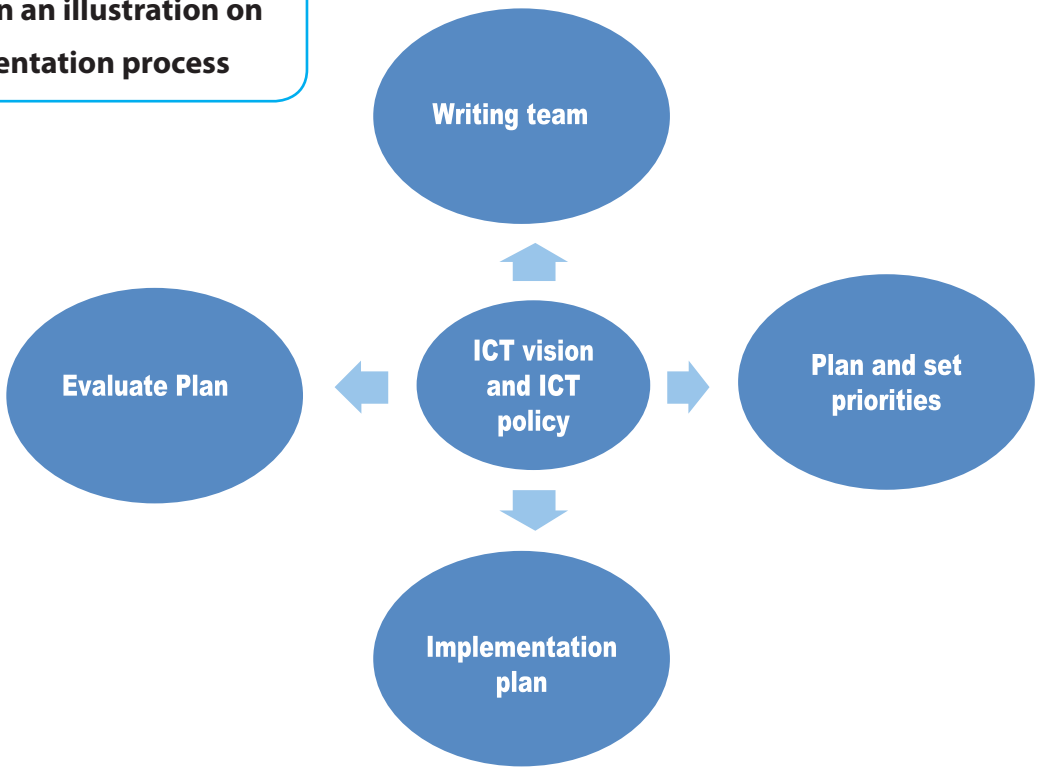
Different teachers be assigned responsibilities and their roles clearly understood

There should be a capacity building programme for continuous skill development to facilitate teachers to create, use and adopt the use of resources.

Evaluation

Team should monitor progress of the implementation process and regularly consult with the all stakeholders.

Note: Design an illustration on the implementation process



Task 2

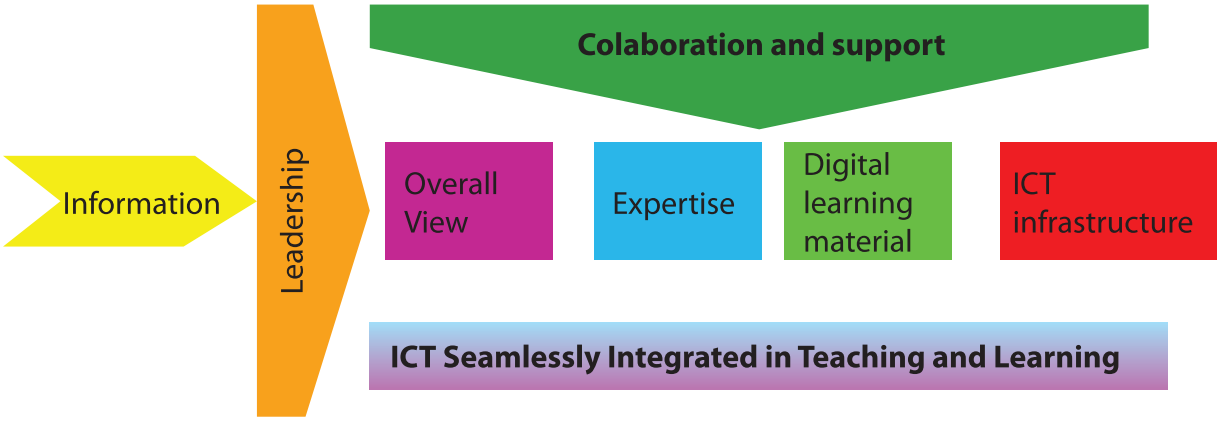
Assign the participants the following task.

'Imagine you are a member of the ICT implementation team in your school. Identify the priority areas and suggest strategies for implementation.
Discuss ways of involving teachers'.

The participants to report back in plenary-possibly using in power point presentations.

Four- in - Balance Model

The facilitator can also present an ideal situation where the **Four- in - Balance Model** adopted by MOEST from Kennisnet can be use in the in the integration process in the school. The balance in the Model refers to alignment of Overall view, Expertise, Digital Learning Materials and Infrastructure. This focus draws attention to integration process in the school.



The **overall view** is the vision of how the school wants to achieve the ideal situation. This can be in relation to the school objectives and changing roles of each and the stakeholders. Relevant policies and instructional designs can then be formulated.

Expertise is the skills that users need. This is in reference to basic ICT skills, competencies and pedagogical aspects towards use of ICT in the school. **Digital learning materials** refer to the actual content. Teachers need skills to search for, evaluate and develop digital learning materials. **Infrastructure** is about the availability and quality of the resources, such as the laptops. Connectivity, management and maintenance are part of the infrastructure.

E: Strategies of organising staff to participate in the ICT implementation in school

- The school leadership should be trained and users of ICT
- All teachers should be involved in developing the ICT Vision and Policy

- Engage staff to bench mark with other schools in terms of pedagogy and management styles of their ICT ventures.
- Determine priority areas as a school such as creation of awareness in the school community, among teachers, learners, parents and SMCs.
- Develop practice of teachers in using ICT in the school.
- Develop capacity of staff in integrating ICT in various subjects
- Involve the entire staff in developing the school's action plan for integrating ICT in the teaching and learning process.

Task 3

organise participants in groups and guide them in developing a school's ICT action plan. (Use the template below)

Name of school; ……..

Priority area Raise the quality of Teaching and Learning so that teaching and learning process integrates….% by December 2014		
Main activity 1. Leading learning by example, mentoring staff and creating a conducive ICT environment 2. Monitor teachers planning and use of the curriculum 3. Monitor standards throughout the school including pupils learning and progress 4. Develop links with community groups for resource mobilization and sustainability		
Expected outcomes 1. Skilled and confident teaching staff 2. Evidence of 1. above 3. A clear ICT vision and policy for the school 4. Innovative approach to teaching		
Action points **(** *indicate each of the expected outcomes in this column)*	**Responsible person***(person in charge for that outcome)*	**Timing** *(specify if annually, monthly or ongoing)*
Skilled and confident teaching staff		

F: Planning an ICT Training Programme for teachers

Task 4

Organise participants in groups and assign them the following task:

'Discuss what you would do to put in place a successful training programme for teachers in your school?'

Note down points given by every group.

- Involve all teachers
- Motivate the teachers to learn ICT skills
- Provide opportunities for teachers to pursue ICT training.

Summary

This section has outlined the process of developing a school ICT vision and policy When this is done by the participants, understanding of the other areas covered such as how they can implement ICT usage in schools, how to plan a training programme for teachers and strategies of organizing staff to participate in the ICT implementation in school will easily follow.

Sub Module 5: Building Effective ICT Teams

Introduction

This sub module will impact into the school leadership skills and competences in building effective ICT teams. It will enlighten on the process of team development, strategies of conflict management within a team and factors contributing to effectiveness of an ICT team. The sub module aims to empower the school leadership to build strong ICT teams for integration of ICT in the teaching and learning process.

"Coming together is a beginning. Keeping together is progress. Working together is success."Henry Ford

Specific Objectives

By the end of the sub module, the participant should be able to:

a. Describe the process of team development
b. Discuss strategies of conflict management within a team
c. Discuss factors contributing to ICT team's effectiveness

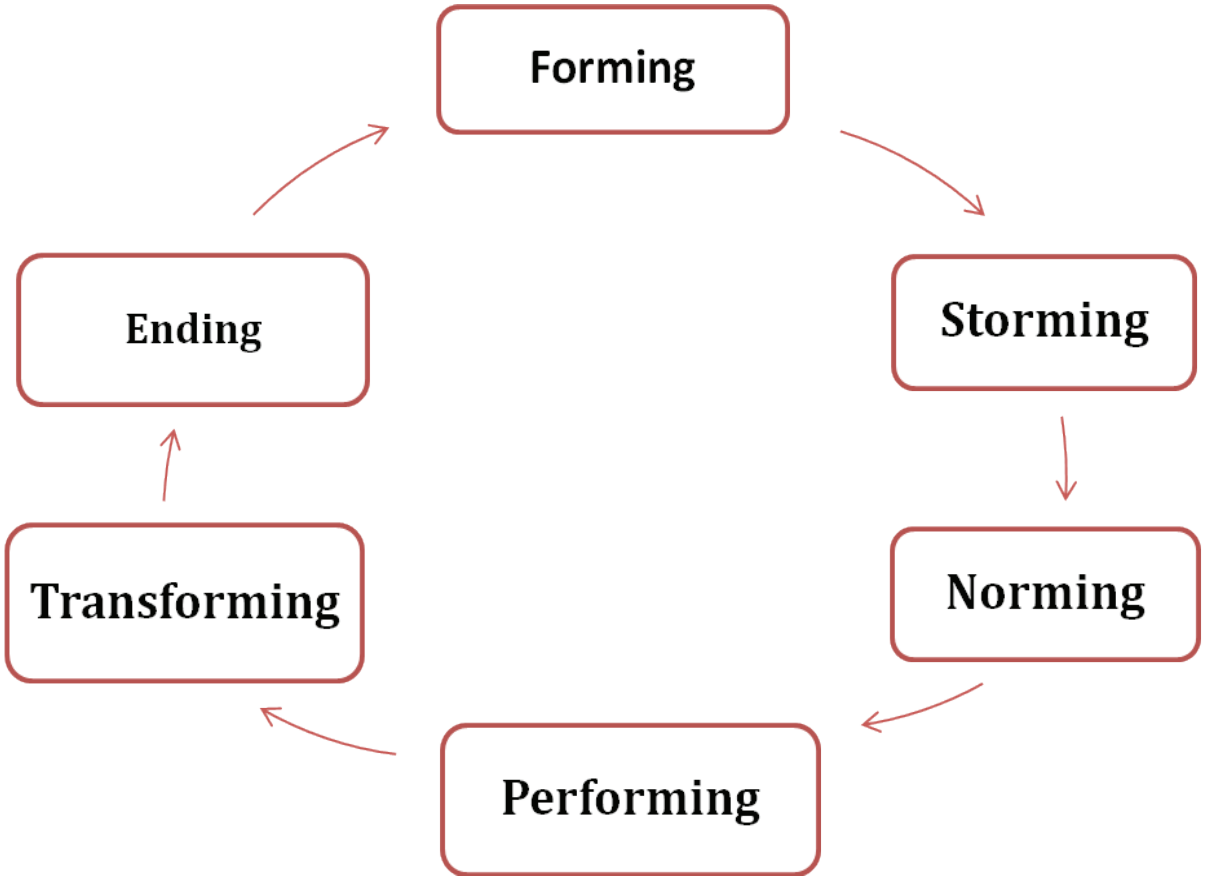
A: Team development process

A team is a group of people working towards a common goal. ICT team in a school include the various sub-groupings all which may interact with ICT devices at different levels. These include: the learners, ICT department, teaching staff, support staff and the school management teams. The ICT teams should focused towards improving the process of delivery of education, unleashing the learners and teacher's innovativeness and potential.

Guidelines on forming an ICT team

i. Set clear ICT goals and purposes
ii. Set specific objectives to measure team progress
iii. Define communication channel among the team members.
iv. Define a procedure for decision making and problem solving
v. Determine the membership
vi. Pick team leader and assign roles
vii. Identify team resources and bounds

Stages of Team Development



Adapted from Bruce Tuckman's stages of team development
Source: hrweb.mit,edu/learning-development/learning-topics/teams/articles/stages-development.

Forming: this is the first stage of forming teams. It involves team members coming together, and getting organized, knowing and understanding one another's roles in the team.

Storming: in this stage, disagreements arise as people to get to know each other from different working, social-emotional perspectives. Team members may disagree on their respective tasks and approaches to achieve them. Team tolerance is important to overgrow this stage.

Norming: in this stage, problems and issues are resolved and members tolerate and accommodate each other. Ground rules are established, working relationship is created and trust for other members is built.

Performing: in this stage, processes become functional guided by the established ground rules. Team members are able to work together in their designated roles. Team members cooperate, support each other and working without external supervision.

Transforming: in this stage, the team is unified and optimum in performance. The team is characterized by high morale, commitment to the overall task and productivity.

Ending: this stage is also called mourning stage. The team has completed its purpose and it is time for team to break up and for members to pursue other goals or projects.

Task 1: Sharing team building experiences

Organize participants into work groups.

Instruct the participant to share work experience on team building process citing case examples encountered during the course of their leadership.

Group leaders to present the case in plenary.

B: Strategies of Conflict Management in a Team

Conflict among team members will occur from time to time. Therefore, strategies and skills in resolving conflicts are essential to build and maintain an effective team.

Guidelines on strategies of managing conflict

i. Bring the team members to express the case causing conflict..
ii. Identify the core object of the conflict.
iii. Express the core object to the conflicting members: ensure that the object case presents a mutual understanding rather than a win/lose situation.
iv. Explore further the root causes of the conflict.
v. Engage the conflicting team members to explore and agree on long term solutions to the conflict emanating from the identified core object
vi. Implement the solutions that have been agreed upon.

C: Factors contributing the effectiveness of ICT teams

Task 2

Organise participants into work groups.

Instruct the participant to discuss the following case and derive an appropriate resolution to the conflict.

Group leaders to present the case in plenary.

Johannes, a mathematics teacher in ABX primary school, obtained a DVD from his counterpart in Jirani primary school. The HOD viewed it and since the content was interesting, he decided to duplicate the DVD so that it could be used in the other classes. In the process, the DVD was irreparably damaged.

Aware of the consequencies, Johannes infromed the headteacher that unless the school intervened, he would take legal action to avoid a conflict with Jirani primary school.

Who is the team leader in the case?

Identify the core object of the conflict.

Outline the measures an experienced and effective team leader would take to resolve the conflict and save the ICT team.

D: Factors contributing to effectiveness in ICT team

Effectiveness of an ICT team is enhanced by constant evaluation of the team in terms of its objectives achievements, efficiency in the achievements and esteem of the members to remain in the team. Also, the team should ensure appropriate delegation of power, individual development and empowerment of team members.

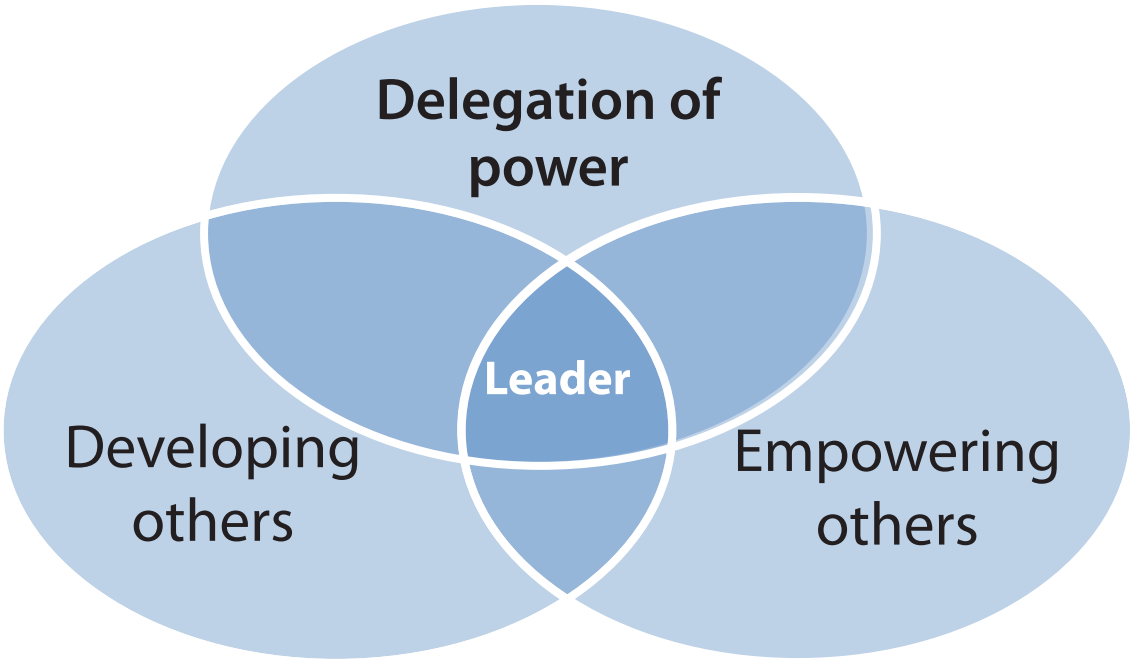
Constant evaluation of the team

The team leader should ensure the team is constantly evaluated and the pace of progress communicated to the members.The evaluation seek to answer the following questions:

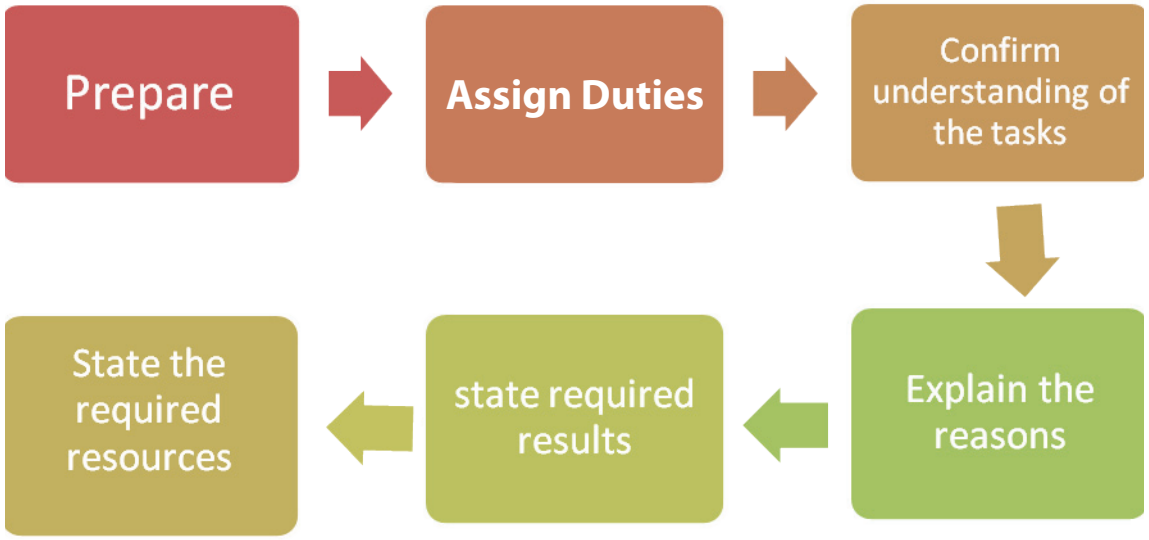
- What does the team aspire to achieve?
- What is the role of each team member in achieving the aspiration?
- What method(s) would lead to attainment of the goals, aspiration and conduct of the team?
- How would the team enhance the welfare of its members?
- How would the leader support the team in achieving results**?**

Power delegation, individual development and empowerment

These are some of the skills required for team's effectiveness, cohesion and progress.



Delegation of power: team leader should transfer of responsibilities or authority from one person to another to enable each member has to own the success of the team. Effective delegation should follow the following steps:

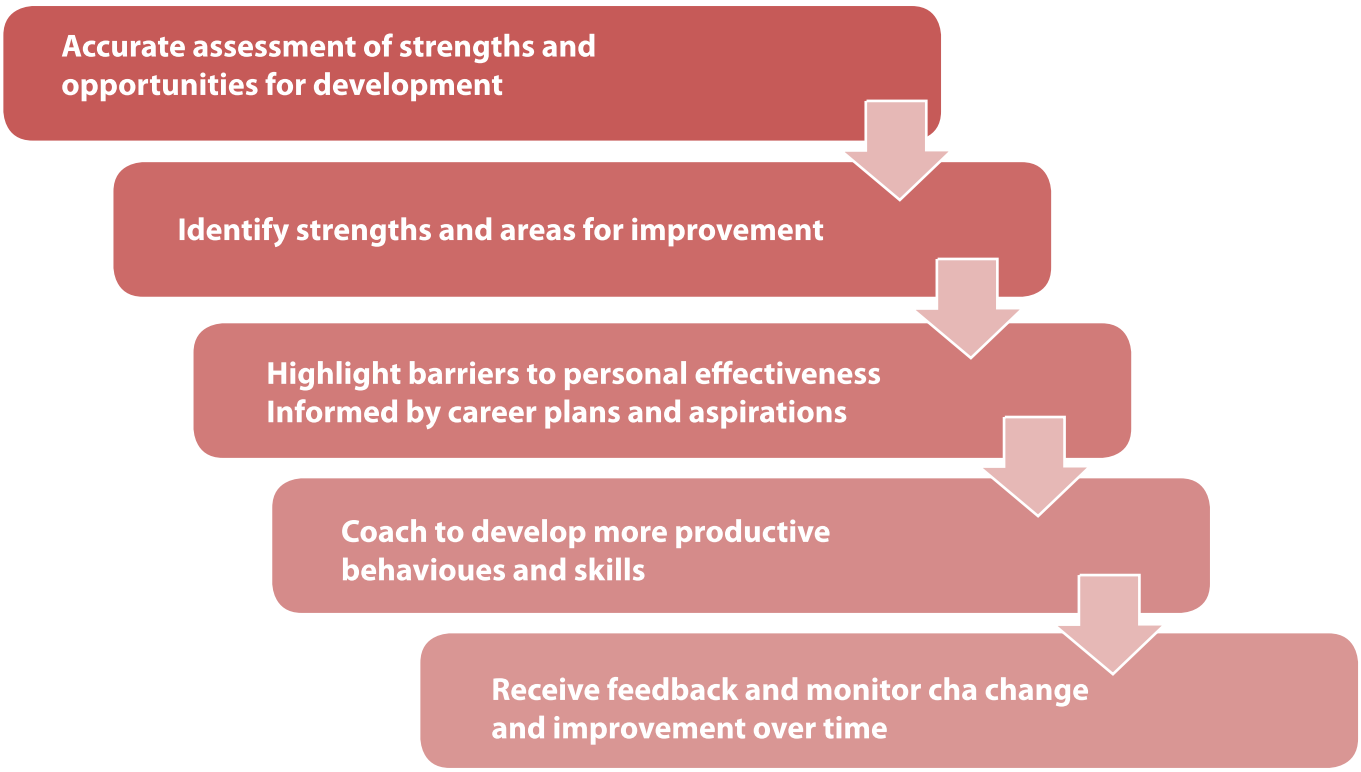


Empowering others: empowering people entails creating an environment in which people are empowered, productive, active and enjoy being in the team. The leader supports, mentors, inspires and allows others to run the teams at different capacities. Guidelines to empowering team members

- Show the members they are valuable by communicating appreciations and worth of their contributions to the team.
- Share the team's vision and mission, strategies and plans with the team members
- Involve members in goal setting, planning evaluation of achievements.
- Trust and entrust delegated team members to make right decision.
- Ensure constant communication and flow of information in the team.

Developing others: The first step to developing others team development framework. It should outline processes, resources, culture, values, skills and knowledge required by the members for successful of the individual tasks in the team.

Team members development process.



Summary Task

Organise the participants into task groups to discuss and later present the following task in the plenary.

Discussion Scenario

'In your capacity as leader, you have received a donation of several laptops and their connective devices to initiate ICT in the functionalities of your institution. Upon evaluation of your staff, you realise that apart from you, only a few members are skilled enough to integrate ICT in your functions. Guide the participants in deliberating on the following issues in groups.

Group A: discuss how you would delegate responsibilities
Group B: discuss how you would develop other team members within scarce institutional resources
Group C: discuss how you would empower the team members to integrate ICT in your functionalities'.

Sub Module 6: Key Stakeholders Involvement in ICT Integration

Introduction

This sub module engages the participants in identifying the key stakeholders in ICT integration and determining their role. They will also acquire skills on how to engage the stakeholders in ICT integration.

Specific Objectives

By the end of the sub-module, the participant should have the ability to:

a. Assess the qualities of key stakeholders
b. Identify the role of various stakeholders
c. Identify ways of engaging the stakeholders in ICT integration.

A. Qualities of Key Stakeholders

Key stakeholders in ICT integration include:

> **Task 1**
>
> In plenary, ask the participants to name key stakeholders.

a) School Community (Parents, Learners, Teachers, Non- teaching Staff)
b) Partners
c) NGOs and CBOs
d) County governments
e) Community Centres
f) Local Professionals and Alumni

Identification of stakeholders is determined by the significance of the stakeholder to the project/ initiative.

Task 2

Divide the participants into 4 groups. Give each group a category of stakeholders and ask them to answer the following questions:

(Groups are: a) School Community (Parents, Students, Teachers and Non- teaching Staff), b) Partners, NGOs and CBOs, c) County Governments, d) Community Centres, Local Professionals and Alumni)

a) Identify the role of the stakeholder assigned to them.

b) How would you involve/ engage that stakeholder in the process of ICT integration in teaching and learning?

Ask the participants to make their presentation in plenary and mount their responses on the wall.

B) **Roles of Stakeholders**

School Community (Parents, Learners, Teachers and Non- teaching Staff)

- The School Community should ensure smooth implementation of ICT integration in teaching and learning.
- The school head should organise for sensitisation / orientation of the parents, teachers, non-teaching staff and learners in order for them to understand the importance of integrating ICT in the teaching and learning process. This will eventually lead to attitude change, especially for the resistant teachers or parents.
- The school Community should support the ICT integration process by embracing and using technology in their day to day activities.
- The school head should ensure capacity building of all the teachers and also acquisition of the required equipment.
- The school community can source for funds from NGOs and other partners.
- They can also initiate Income Generating Activities (IGAs) whereby the proceeds can be used to enhance the integration process e.g. paying bills, acquiring more computers/ laptops, etc.

Technology is just a tool. In terms of getting the kids working together and motivating them, the teacher is the most important. Bill Gates

Partners, NGOs and CBOs

They provide support in terms of capacity building, funding and other resources.

County Governments

Their role is mainly to supervise and co-ordinate the activities carried out to ensure smooth implementation e.g. capacity building/ orientation of training of the teachers, distribution of the computers/ laptops and other equipment, and disbursement of funds to the county.

Community Centres, Local Professionals and Alumni

- These can also support the process e.g. by either helping to initiate some IGAs or getting involved in the already existing ones.
- They can also assist in the sensitization of the communities to embrace technology.

C) **Ways of engaging the stakeholders in ICT integration.**

The can get involved in various activities leading to the successful implementation of the ICT integration process, for example in:

- Sensitization workshops/ seminars
- Resource mobilization
- Creation of sustainability strategies
- Field visits to project sites
- Capacity building of teachers
- Monitoring and evaluation

Summary task

Recap the session by asking the participants the following questions:

1) Who are the key stakeholders involved in the process of ICT integration in teaching and learning?
2) What are their roles?
3) How do you get them engaged during the process?

You can get a few responses from the participants just to gauge if they have understood the sub topic.

Sub Module 7: Resource Mobilization and Sustainability

Introduction

Resource mobilization goes beyond sourcing for funds. It is a process used by the leadership to seek partners and resource providers whom they can identify with, and take steps to expand and manage the relationship. The school leadership must ensure that the school can raise resources to sustain ICT integration in teaching and learning. Types of resources include finances, human and technical resources, equipment, information and services. Resource mobilisation is done by forming partnerships with local communities, volunteer organizations and other partners.

This sub module aims at equipping the course participant with resource mobilisation skills and ability to formulate strategies for sustaining ICT integration in teaching and learning.

Specific Objectives

By the end of the sub module unit, the participants should have the ability to:

a. Describe resource mobilisation skills
b. Determine strategies for sustaining ICT integration in teaching and learning.

A. Resource mobilisation skills

The integration of ICT in teaching and learning requires adequate resources which determine effective implementation. Consequently, there is need to continuously source for resources in order to be in tandem with emerging technologies. It is therefore imperative that leaders be equipped with the requisite resource mobilisation skills.

Task 1

Lead the course participants to reflect on a project they have successfully undertaken in their schools.

What skills did they employ to ensure the project succeeded?

Groups to share their reflections in plenary-resource mobilization skills are highlighted

Resource mobilization is a team effort. A good resource mobilizer should have certain skills and personal attributes. Among the skills that a resource mobilizing person or team should have are:

- Negotiation
- Effective communication

- Monitoring and evaluation
- Conflict resolution
- Financial management

Some of the attributes that a good resource mobiliser should have are:

- Impeccable integrity
- Ability to listen well
- Passion for work
- Ability to motivate
- Perseverance and patience

Note; Remember there are no quick fixes in resource mobilization!

Sourcing of funds

Task 2

Reflect on some of the projects you have initiated in your school and discuss the methods you used to source for funding.

Facilitator to ask for volunteers to share their experiences in plenary and capture key fund raising strategies

Hints:

- Grants/Aid
- Income generating activities
- Organizing special events for fundraising
- Donations
- Constituency Development Fund
- Alumni
- Local community support
- Timely technical support

- **Networking/partnerships**

  Identifying partners is a strategy for resource mobilisation. Networking is about relations, contacts and **mutual support**. The concept of ICT integration being relatively new in primary schools necessitates that schools do not work in isolation. Building networks or joining an existing network helps in exchange of information and makes a greater impact in efforts to integrate ICT.

Networks or partnerships can be done through formal proposals or by informally approaching potential partners or those that one has worked with before.

Task 3

1. Identify possible partners whom you can approach for partnership in ICT integration in your school
2. State the areas of ICT integration in which you would collaborate with the different partners.

Hint: Specific CBOs, NGOs, CDF, local community, businessmen, etc.

Task 4

1. Divide participants in appropriate groups
2. Let them work out a resource mobilisation action plan for Jumbo school using the following format
   (one item may be filled together to guide the groups)

Resource mobilisation action plan				
Resource gap	**Partner to approach**	**Resource mobilisation mechanism**	**Budget**	**Responsible person**

One or two teams can present in plenary while the rest of the participants give their input

- **Factors to Consider when Identifying Partners in ICT Integration**

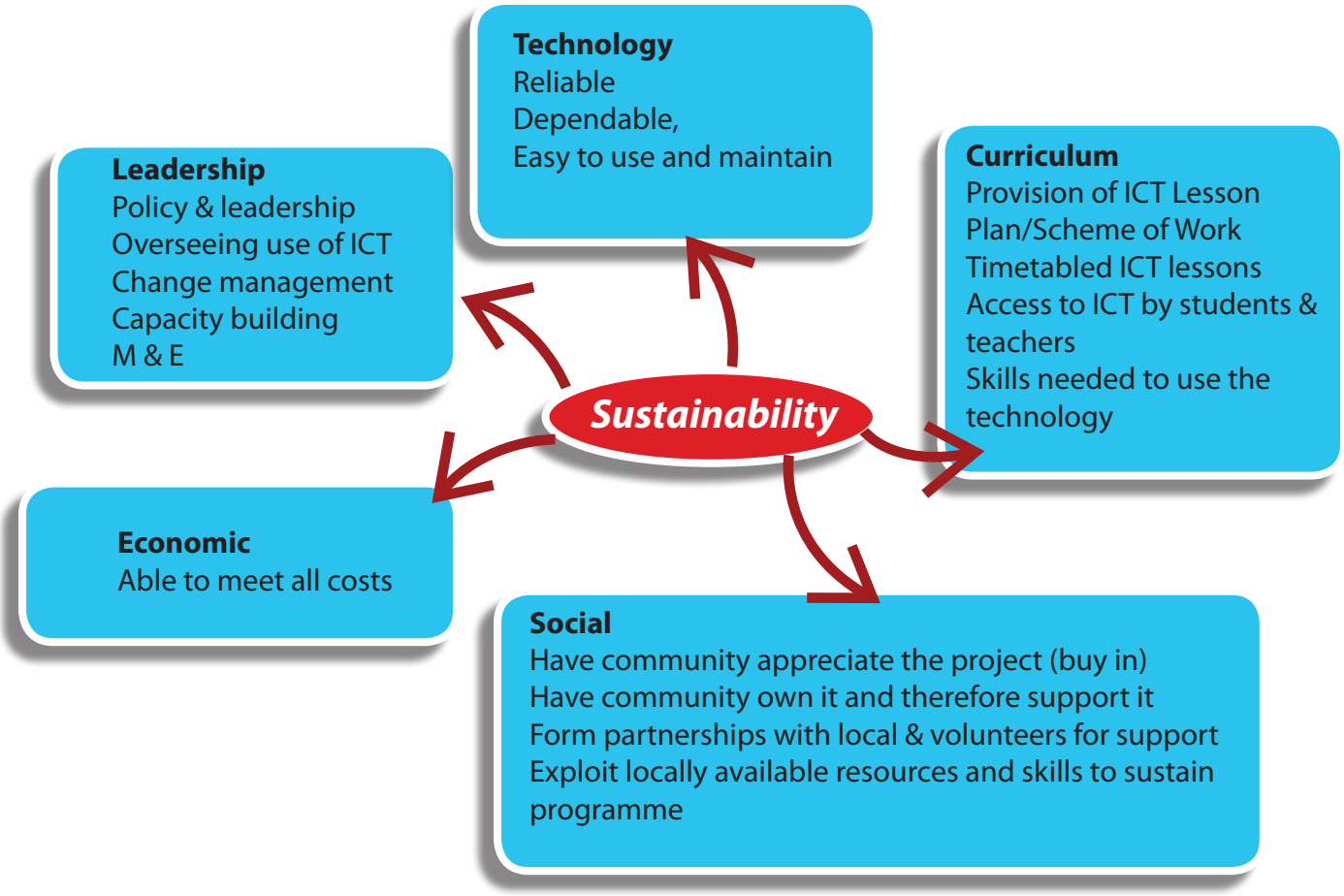
Additional notes.
Donor mapping should be done where partners' scope and interests with what is required by the school can be matched. The moral aspect of partners should also be within the school ICT policy and the wider ICT policies of the Ministry of Education, Science and Technology. Ethical issues should therefore be considered by understanding principles of the partners vis-à-vis values of the school

B. Strategies for Sustaining ICT Integration Projects

Sustaining the ICT programme requires a sector wide support and commitment from all members of the school community e.g. school administration and management, teachers, learners, parents, and collaborating partners.

Sustaining the project requires skills in ICT, education, management and planning, marketing and business. The school needs to have a sustainability planning team to come up with ways of sustaining their ICT integration programme. Strategies involve leadership, technology, curriculum, economic and social aspects.

Sustainability summary



Task 5:

Arrange the course participants to undertake this task in groups. Within the groups, members identify individuals to play the different roles.

Last year Jumbo Primary School received laptops from a certain donor. The school has sent a proposal requesting for more funding from the same donor. The donor has requested for a brief meeting in his/her office for the school management to elaborate on the request. The meeting is attended by the head teacher, SMC chairman, PTA chairman, teacher in charge of ICT and the donor.

1. Let the groups outline the key points that each member will cover during the meeting
2. Do a role play of the brief meeting.

Summary

Wrap up of areas covered

What is resource mobilisation?

What are the skills and traits of a good resource mobiliser?

Sources of funding for schools

Identifying and creating partnerships

Strategies to sustain ICT integration in a school

Module Two

BASIC SKILLS, INTERNET USE, MAINTENANCE, SAFETY, SECURITY AND ETHICS

Sub Module 1: Introduction to ICT

"If we teach as we taught yesterday, we rob our children of tomorrow" John Dewey

Introduction

This sub module provides a discussion of key ICT terms, and the historical perspective of computing in education. It also describes various applications of ICT and the benefits of using ICT in personal life and the school environment. The sub module further discusses how ICT can be used to enhance the roles of a teacher.

Specific Objectives

By the end of the sub module unit the course participant should be able to:

Define key ICT terms;

a. Outline the history of computing relevant to education.
b. Describe the applications of ICT in personal life and school environment.
c. State the benefits of ICT in personal life and school environment.
d. Apply ICT skills to enhance the roles of a teacher.

a) Definition of key ICT terms

Task 1

What are some of the technologies that can be used for enhancing teaching and learning in schools?

(Course participants to give their inputs as they are recorded/projected)

Information and Communication Technologies (ICT)

ICTs is an acronym that stands for Information and Communication Technologies. ICT includes the full range of computer hardware, software and telecommunication facilities. Thus it includes computing devices ranging from hand-held calculators to multimillion dollar super computers. It includes the full range of display and projection devices used to view computer output. Others are local area and wide area networks that allow computer systems and people to communicate with each other. ICTs also include digital cameras, computer games, CDs, DVDs, cell phones, telecommunication satellites and fiber optics. There are also computerized instruments, computerized machinery and computerised.

ICT is defined as a "diverse set of technological tools and resources used to communicate, create, disseminate, store and manage information."

Effective ICT integration into the learning process has the potential to engage learners and thus make learning more meaningful. It supports various types of interactions in the learning environment: learner-content, learner-learner, learner-teacher, and learner-interface. This makes the teaching learning process more **interactive** and learners more **active** and **engaged**.

b) Computers in Education: A brief History

Task 2

Lead the participants to discuss in small groups some of the changes to do with technology in education that they have witnessed in the last 30 years (own experience or documented)

Groups to present their findings in plenary in the format:

Outgoing technologies	***Incoming technologies***
eg: manila paper and flip charts	*white boards and smart boards*

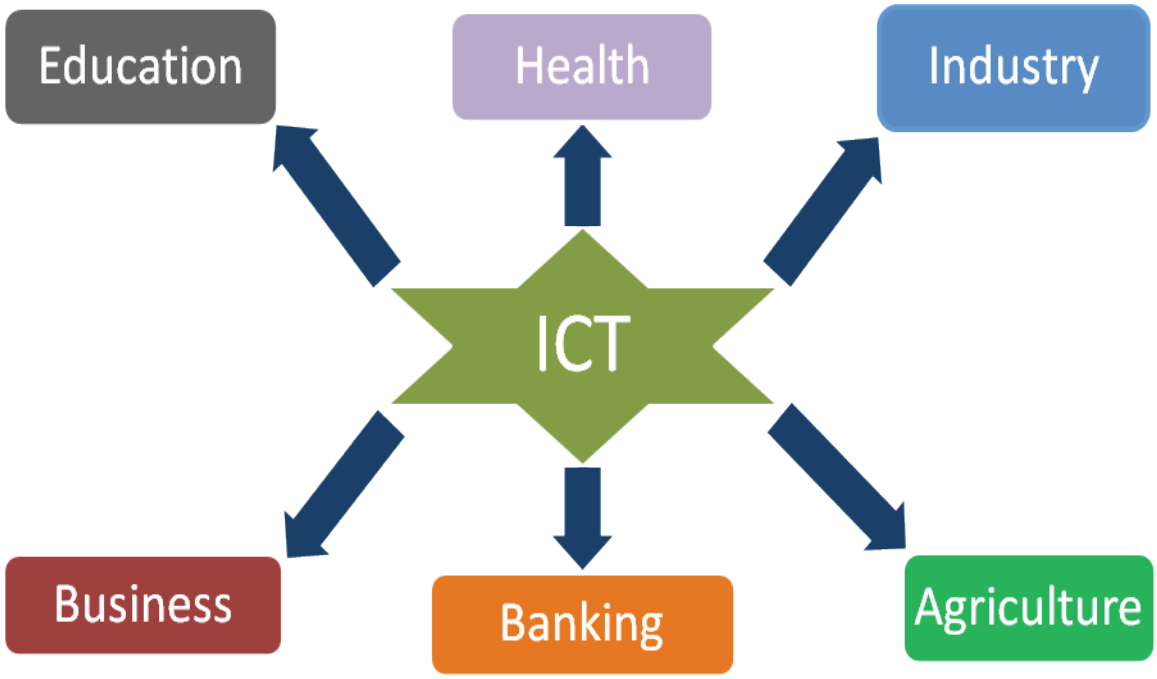
The use of ICTs in education has expanded greatly since the 1980s. More recent developments have been the use of internet and the World Wide Web which have stimulated new demands and expectations in education.

The use of ICT in the Kenyan education sector is still in its infancy stage. There has been significant progress in that there is now more awareness of the importance of integrating ICT in education. Some of the emerging trends the adoption of ICTs in education have been: increased use of email for communication, digitisation of curriculum, use of DVDs for dissemination of content, training of teachers in ICT, online teacher orientation, and the use of digital content in teaching and learning.

c) Applications of ICT in personal life and school environment

The use of ICTs permeates virtually every sector of our lives today. It has brought about drastic technological, social and economic transformations.

Some of the uses of ICT in daily life



Some examples of usage of ICT in daily life

Factors	Usage	Example
Education	• Find useful information • Manage books in libraries • Open and distance learning	• Internet research • Library automation systems • Learning communities
Banking	• Withdraw money • Online banking	• Automated teller machines • Check account anywhere, any time
Industry	• Automobile manufacturing industry • Aerospace research	• Robotic and artificial intelligence • High-tech machines, supercomputers
Commerce	• Buying and selling on the internet • Advertising • Stock markets	• Online payments e.g. EFT • Bill boards, electronic media • Online stock trading and portfolio management
Agriculture	• e-agriculture	• Enhanced agricultural processes
Health	• Advanced diagnostics	• Digital imaging

d) **Benefits of ICT in school environment**

Task 4

Brainstorm on the question; What are some of the benefits of integrating ICTs in teaching and learning?
Groups to present their thoughts in plenary as a recorder builds up a list of points as they are raised.

Hints:

- ICT facilitates access to content that would otherwise be unavailable in the traditional classroom
- Pupils learn and practice important information skills while working on the project
- It helps make learning a fun and exciting activity by appealing to pupils' creativity
- Pupils have contact with modern technology and knowledge, aiding their development
- ICT can enrich the teacher's knowledge and skills

e) Application of ICT in enhancing teacher's roles

i. Classroom Management

Classroom management is about ensuring that classroom activities run smoothly and that disruptive behaviour is managed. It is closely tied to issues of class control, motivation, discipline, respect, communication and cooperative learning.

The use of ICTs can enhance class management in a number of ways. Teachers can use multimedia elements in their teaching since they are motivating to learners. A teacher can also communicate important official information to each learner through their emails.

The use of ICTs in teaching and learning can present its own unique management challenges. One of the dangers is that learners can access inappropriate information. They could also be accessing social sites such as *Facebook* instead of doing class work. The teacher can manage such misuse by disabling the computers of such learners and warning them.

ii. Teaching and learning

ICT is a new tool of education and by integrating the technology across as broad a range of the curriculum as possible, educators are broadening the horizons for pupils. ICT cannot evoke learning on its own; it needs to be put into context and guided by the teacher. It can only play its role when principles of learning and the structure of teaching are respected.

What therefore does integration mean?

Essentially, it means that we use available software to extend a broad range of skills in the children. The computer then is not only what the children learn about but also what they learn through and perhaps with. Children get access to multiple resources and multiple activities that will often demand collaboration. This collaborative approach will place demands on planning and teaching styles.

The use of ICTs can enhance the teaching learning process through a number of ways;

- representation, manipulation, exercising, applying
- have a dynamic representation enabling the understanding of the complexity
- add a dimension to the enactive representation; e.g. a downloaded film
- let learners see the relevance of a topic/issue
- reinforce and enhance teacher activity (NOT replacement)

iii. Assessment and examinations

The use of ICT for assessment is commonly referred to as Computer Aided Assessment (CAA). CAA software enables the teacher to create, deliver, mark and analyse tests objectively. For self-assessment, CAA packages can also provide supportive feedback on each question and be used to aid learning

throughout the course.

There is a lot of software available on the market to assist with student assessment. A few examples are:

- The Castle toolkit (freely downloadable from the Internet) is an easy-to-use means of creating multiple choice and multiple response tests, authored and delivered on the web.
- Hot Potatoes software, which is helpful to the teacher when constructing exercises, games, crosswords and quizzes. This software is available for free at http://www.halfbakedsoftware.com

In a traditional classroom setting, ICT can be gradually integrated in the assessment process. As a first step, teachers commonly use ICT to analyze and keep records of learners' performance. The Excel software, for example, can be used to keep records of CATs and examinations. One step further, teachers can discover the use of school management information systems that have record keeping facilities for assessment information.

iv. Communication and collaboration

Learning is an interactive social endeavor between teachers and learners. This interaction is through communication. The communication is in various forms such as giving and receiving instructions, asking and answering question as well as assembling information, organizing it and presenting it to others. The common form of classroom communication is through verbal and written work.

Email is a popular method of communication. You can access email on a computer, a mobile phone and other digital devices that have wireless connectivity.

Collaboration

There are a number of ICT tools that enable people to work together on a project even when they are in different locations.

Video conferencing

Video conferencing is a great way of holding meetings when the attendees are not all together in one location.

You need a webcam to capture the video, a microphone to capture the sound, video conferencing software and a high speed internet connection to handle the data transfer.

Online workspaces

Files stored in online workspaces can be accessed from anywhere in the world, providing there is an internet connection. This makes it easy to share fi les with other people and work collaboratively on a project. Access to an online workspace is password protected. An administrator with full access rights manages the workspace, with other users having limited access rights.

Summary Task

Imagine that you are the class 7 Social Studies teacher in your school. The school has all the necessary facilities for ICT integration including internet connectivity.

Design an activity you would involve your pupils in as a project for all pupils.

Groups to present their work in plenary

Hint:

The task should make learners use as many ICT skills as possible e.g.

- sourcing for information from the internet
- using appropriate application to compile a report
- printing a hard copy for submission
- Sharing with colleagues through their emails

Sub Module 2: ICT Devices and Use

Introduction

This sub module will discuss the ICT devices that used to support teaching and learning. ICT tools are in the form of hardware and software. The hardware refers to all electronic gadgets such as computers, projectors, printer, smart boards, mobile phones, digital cameras, radios, televisions among others. The software refers to all programmmes that drive the operations of the electronic gadgets listed above. They include but not limited to Microsoft Windows, Microsoft Office, Corel Draw, Learning Management systems and Photoshop.

Specific Objectives

By the end of the sub- module unit, the course participant should be able to:

a. Identify ICT devices that can be integrated in teaching and learning
b. Describe parts of ICT hardware devices
c. Determine appropriate devices for specific teaching and learning tasks
d. Use ICT devices in teaching and learning.

A: ICT hardware devices

Digital Camera and Camcorders  	• Camcorders are used to record demonstration lessons and be played back to learners and even teachers to promote learning. • Digital cameras are used to take pictures, download the pictures, import them into Word or PowerPoint, manipulate the images, use still images in an iMovie, create an iMovie and how to create a Web photo gallery using Photoshop Elements. As part of each class, teachers are also required to create a digital camera lesson to be used in their classroom. • Teachers use the camera to enhance lessons, for student assignments, for collaborative projects, to enhance their class Web pages, to display student work, to assist in teaching world languages, to encourage effort through immediate recognition of achievement, and to record student progress. • Use of digital cameras has been highly motivational and has contributed to greater integration of technology into the curriculum and an effective method to improve communication.

Television 	• Provides teachers and learners learning resources that are located at distant places that may not be reached by some teachers and learners • Provides demonstration of classroom management and best practices to help teachers to implement new teaching techniques • Potential to reach large numbers of learners. • Promotes life skills i.e. careers in photography and video.
Radio 	• Promotes listening skills • May be used in situations where textbooks and other teaching aids are scarce • Can be effective for learners where learning is based on hearing such as visually impaired.
Mobile Phones 	• Promotes collaboration among teachers and learners • Promotes better communication between the teacher/school and the parents.
OUTPUT DEVICES Is a piece of hardware that is used to display or output data which has been processed or has been stored in the computer. There are different ICT output devices. You need not know all of them, but be able to identify the most common ones make suggestions on which device to use in a given scenario.	
Monitors 	- A monitor (or screen) is the most commonly used output device. - They come in different sizes, shapes and forms. - Large monitors make observations easier and clearer. - Modern operating systems can operate a dual monitor set up.
Printers 	They are used to create 'hard copy' of your work i.e. something you can hold, file away or hand to someone else. Most printers produce their output on paper. Some printers are able to print on to CD and DVD disks with suitable holder. Ink – jets are good for low volume use as they produce excellent texts and photo outputs but the cost is high compared to Laser printers.

Digital Projector 	• Is a device which connects to a Computer and is used to project the video output from the computer to a wallpaper or a screen. • In classrooms they are used on a white screen or wall. • Can be placed on a stand or mounted permanently on a ceiling hanger. i. Digital Projectors are used in classroom teaching, staff training sessions, a presentation to the audience, home cinemas.
Other hardware devices include: - • Smart board, plotters, head phones, speakers, and touch screen among others.	

Task 1

Organise the course participants into task groups.

Assign them to discuss how a teacher would use a mobile phone as an ICT device to present a summary of an educational field trip held by learners to a far destination.

In the explanation, give other ICT devices and how they will be used to make the lesson a success. Also, explain how the lesson would be of help the subsequent cohort of learners.

B: Appropriate ICT devices for Specific teaching and learning tasks

Devices for conventional class

Effective use of technology involves considering the concepts, skills, and content you expect learners to learn, then selecting technologies to offer related opportunities for the learning experience.

You may get ideas about using different technologies from a variety of sources, including colleagues who have had success from a particular resource.

Devices for PWD-Persons with Disabilities

ICT is being used as a tool for improving the quality of life, efficiency and effectiveness. Different ICT tools assist people with disabilities by providing them with learning opportunities, capabilities and potential in different walks of life. Web Content Accessibility Guidelines (WCAG) 2.0 has given wide range of recommendations for making Web content more accessible to a wider range of people with disabilities such as blindness and low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities and photosensitivity. Combination of these web applications developed using these guidelines often make Web content user friendly to the learners.

Devices for PWDs in learning should be able to;

- Provide text alternatives for any non-text content
- Provide alternatives for time-based media.
- Create content that can be presented in different ways without losing information or structure.
- Make it easier for users to see and hear.
- Make all functionality available from a keyboard.
- Provide users enough time to read and use content.
- Make text content readable and understandable.
- Help users avoid and correct mistakes.
- Maximize compatibility with current and future user agents including assistive technologies.

Task 2

Organise the course participants into task groups.

Assign them to discuss and give specific examples of ICT devices that would assist teaching and learning process for the following groups of PWDs:

Group A: Speech disabilities
Group B: Visual disabilities
Group leaders to make presentations during plenary.

D. Integration of ICT Devices in Teaching and Learning

The use of ICT devices in the teaching and learning is essential to enhance presentation of concepts, learner participation, acquisition self-paced instructions, extend access to information, bring the world experience to the classroom and carrying out administrative tasks.

Enhancing presentation concept: ICT helps illustrate procedures, equipment, or situations that learners may not have the chance to experience firsthand information. Learners visualize the concept and gains the knowledge from wide range of information and media presentations.

Stimulate learner participation: ICT caters for the various learning styles since learners have varied capacities.

Enable Self-Instruction: ICT gives an opportunity for learners to refer and learn content in self-paced instructions. It adds depth to points covered in lecture or demonstration and allows learners to compile precise revision notes.

Extend Information Access: ICT increase communication among teachers and learners, clarifies lecture, lab, or textbook explanations and provides feedback.

Bring the World into the Classroom: it enable learners to interact with authentic data

Help in Administrative Tasks: it frees up instructor's time for instruction and relationship development with learners by streamlining processes.

Summary Task: Individual puzzle

Assign the participants to following puzzle to test their understanding and creativity.

Damaas, a science teacher in Integration primary school is planning a lesson that will discuss ***parts of a plant*** *in the class lesson scheduled next week. Damaas has started preparing for the lesson today to ensuret that the 'plant structure' is timely saved into a laptop. How many ways could Damaas get the 'plant structure' into the laptop?*

Advise Damaas…now!

Give participants one minute to jog their mind. No discussion whatsoever. Ask the participants to state "how many ways", and give opportunity for *the one* who states the highest number to explain.

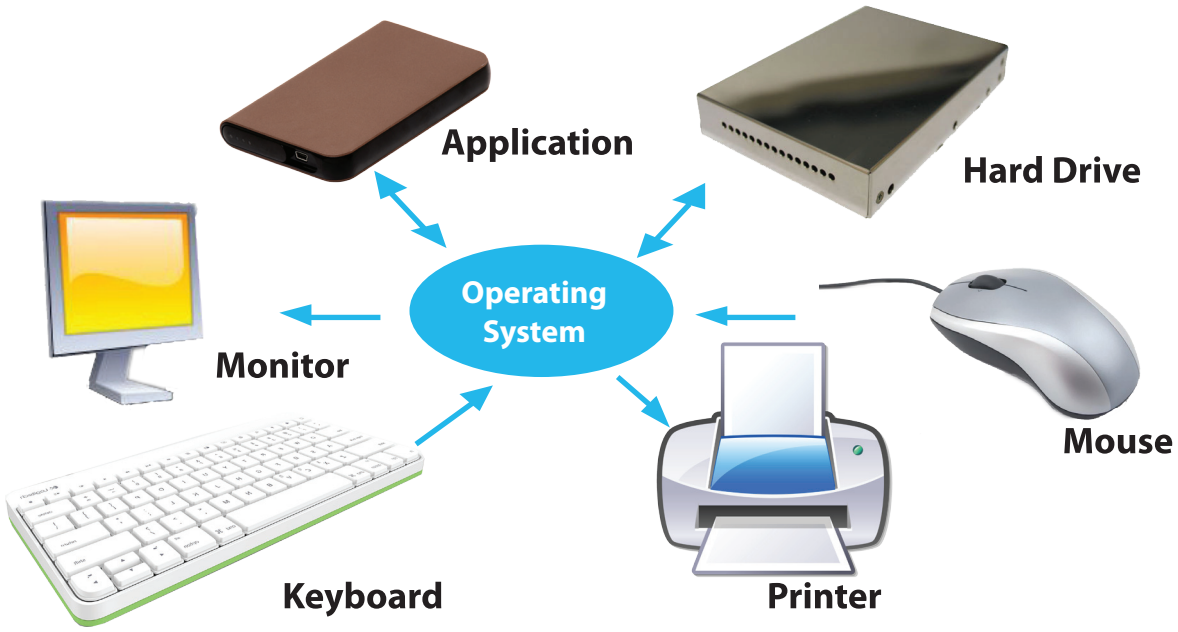
Record correct (applicable) responses on a flip chart.

Sub Module 3: Introduction to Operating Systems

Introduction

This section covers the definition of Operating System, functions and examples.

Diagrammatic Representation of the Working of the Operating System



An Operating System, or OS, is low-level software that enables a user and higher-level application software to interact with a computer's hardware and the data and other programmmes stored on the computer.

An OS performs basic tasks, such as recognizing input from the keyboard, sending out put to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as printers.

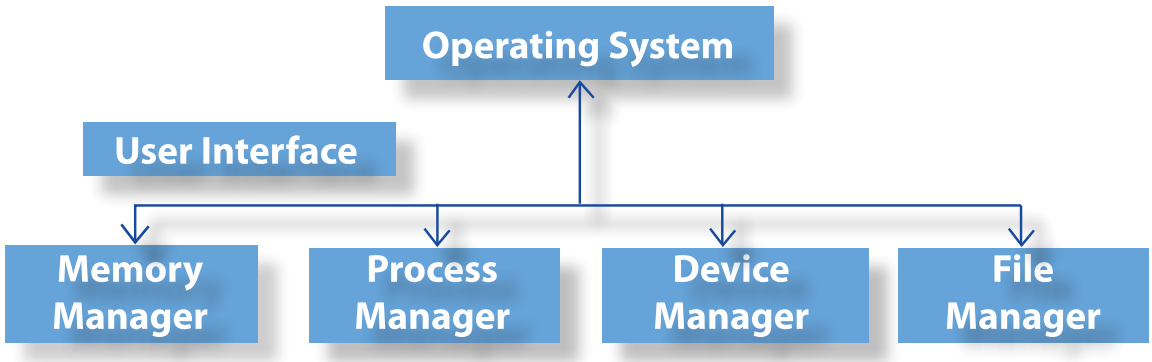
Specific Objectives

By the end of the sub- module unit, the course participant should be able to:

a. Identify the basic components of an operating system.

b. Explain the common functions of an operating system.

a) Basic Components of Operating System



Process Manager

- Process is a programme in execution --- numerous processes to choose from in a *multiprogrammed* system,
- Process creation/deletion (book keeping)
- Process suspension/resumption (scheduling, system vs. user)
- Process synchronization
- Process communication

Memory Management

- Maintain book keeping information
- Map processes to memory locations
- Allocate/de-allocate memory space as requested/required

File Manager

- File creation/deletion.
- Support for hierarchical file systems
- Update/retrieval operations: read, write, append, seek

Input/output Device Management

- Disk management functions such as free space management, storage allocation, fragmentation removal, head scheduling
- Consistent, convenient software to Input/output device interface through buffering/ caching, custom drivers for each device.
- Mapping of files to secondary storage

b) Functions of Operating System

An operating system performs four primary functions.

- It manages and controls the hardware connected to a computer.
- It helps other programmmes running on a computer to use the hardware.
- It helps you organize and manage files and folders on the computer.
- It provides a user interface that allows you to interact with the hardware, the operating system itself, and other programmes.

Sub Module 4: Application Programmmes

Introduction

Application or productivity programmes are tools used to create documents for presenting information. They are usually in different formats such as tables, charts and graphs. This module makes reference to the **Microsoft Office 2010 application suite.**

Specific Objectives

By the end of the sub- module, the participant should be able to:

a. Identify the basic features of applications programmes
b. Determine applications programmes for specific teaching and learning tasks.

A. **Common tasks by Application programmes**

WORDPROCESSOR	SPREADSHEET	PRESENTATION
Word wrap	Sort data	Sound
Justification	Automatic calculation	Image
Adjustment and Centering	Conditional formatting	Animation
Alignment	Search and filter	Slide transition
Auto spelling	Graphs: pie charts, bar charts	hyperlink
Tables	Replication: dragging	buttons
Footnotes & headers		
Copy, paste, cut text		

B. Application programmes for specific teaching and learning activities.

Task 1

Ask the participants to discuss the following issues in small groups:

the documents used in the administration of various teaching activities

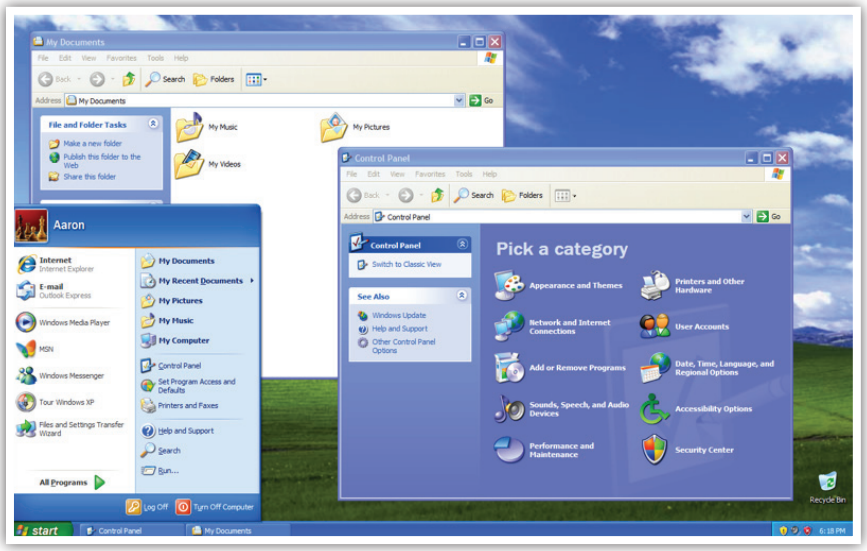
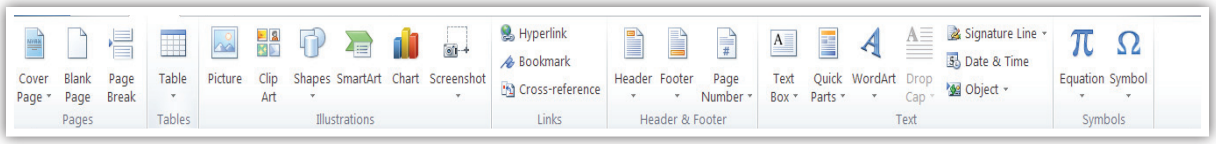
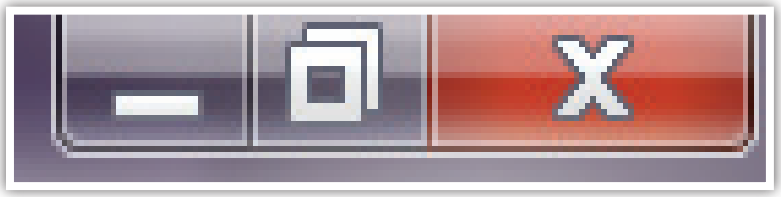
the application program best suited for the preparation of these documents

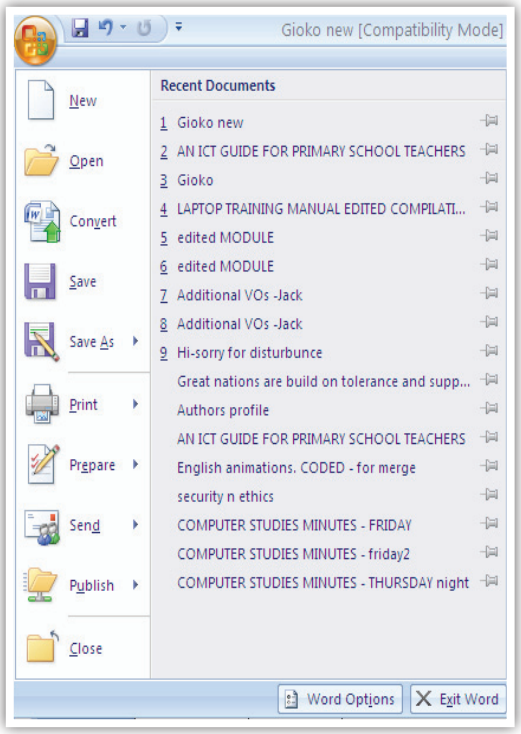
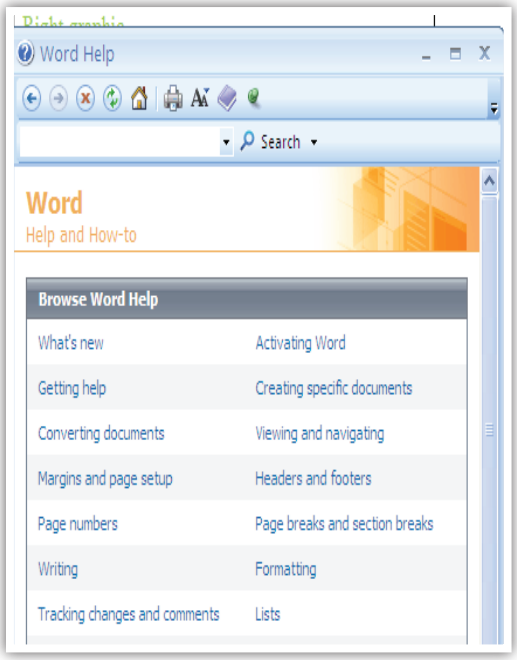
(Observations of each group to be presented during the plenary)

Programme	Description
Word processors	Word processors are programmes used to create documents that mainly contain text. Some of the documents you could create using word processors are: lesson notes, schemes of work, lesson plans, minutes of meetings, record of work books, class tests and examinations. The Microsoft Word processor is the most commonly used word processor.
Spreadsheet programmes	You can use a spreadsheet program to work with numbers and perform mathematical calculations such as mark sheets (for analysis of marks). Spread sheets can also be used to develop budgets and generate graphs. The Microsoft Excel is an example of a spreadsheet programme.
Presentation programmes	You can use programmes such as Microsoft PowerPoint to combine graphics and text so as to create presentations.

C. Basic features of application programmes

user interface	 helps you interact with a programme on your computer.

Window	 A **window** is simply a rectangular area that contains a document, programme, or message.
Ribbon	 The ribbon is found at the top of the work area. It contains a highly visual layout of tools relating to specific functions. The tools are organized into a set of menu tabs such as Home, Insert, Page Layout among others.
Title bar	 The **title bar** displays the name of the document that is currently open.
Restore tab	 This comprises of the maximising, minimising and closing buttons.

Menu Tabs		There are various types of menu tabs to enable users to easily access commands for common tasks—such as opening, saving, closing, and printing files. The menu tabs are either horizontal or vertical. The vertical ones are like the file menu while the horizontal ones comprise of the menu bar for example, page layout and references among others.
Help button		The **Help button** appears at the right end of the Ribbon. Using this button, you can search for help topics that are related to the programme. **Help button**

A workforce which has ICT skills is able to handle information, is creative and adept at problem solving in order to generate knowledge. (*UNESCO ICT competency framework for Teachers ver2)*

Word Processing

Introduction:

A word processor is a specialized programme that allows you to change the look and feel of a text document. It also has tools for creating documents by inserting media such as graphics, charts and tables. A word processor programme enables you to make notes, write examinations, stories and make lesson plans.

Specific Objectives

By the end of the sub- module, the participant should be able to:

a. Open and use word processors
b. Edit and format text
c. Manipulate tables and graphics
d. use basic functions and formulas
e. Print a word document

Success in pedagogy is to Know how to proceed with the teaching (whether to move on or re-teach), how to advise students, how to amend teaching, revise an activity or resources (UNESCO ICT competency framework for Teachers ver2)

Task 1

Using a projector, demonstrate how to open a word document and enter text on basic personal information. Afterwards, ask each participant to generate a class list using a word processor.

Hint: Click the Start button, point to All Programs. Click Microsoft Office, and then click Microsoft Word 2010. Add text in the document by typing text in the working area.

A. Getting started in word processing:

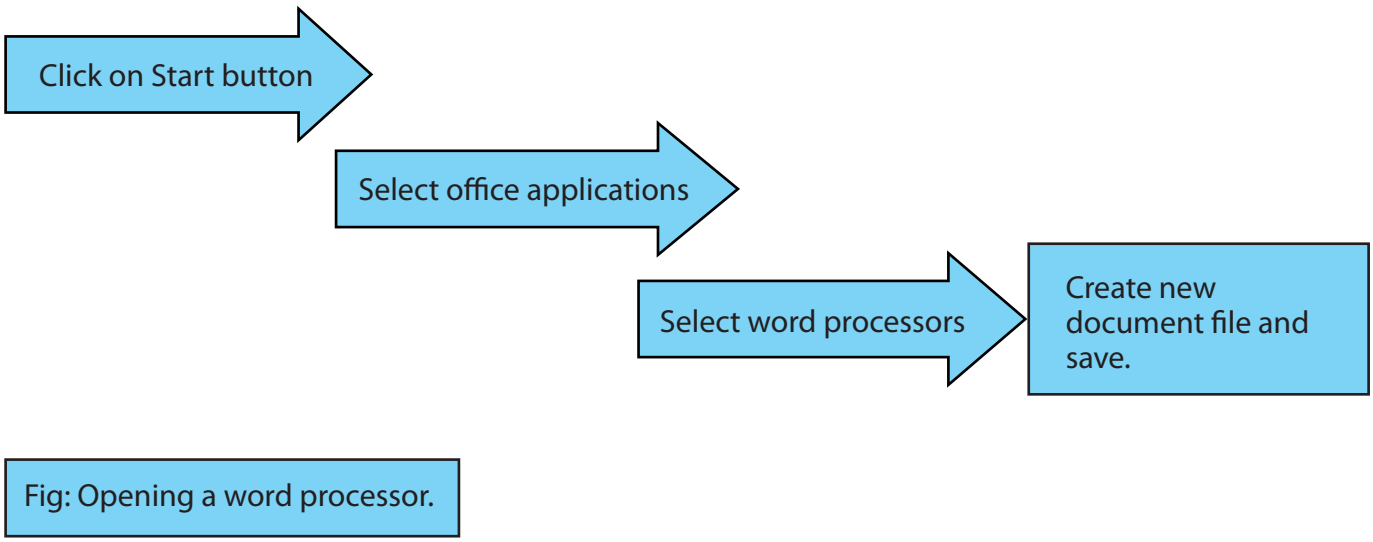


Fig: Opening a word processor.

Editing and formatting text

This function helps you to easily cut, copy, paste, undo and redo as well as formatting and alignment of text.

C. Tables and graphics

These are tools for presenting information in an easy-to-understand format.

Task 2

Ask the participants to do the following in groups of five:

- To create a table and enter the names and dates of birth of five pupils.
- To create another table and insert a picture.

Hint: In the Insert Picture dialog box, select and click insert on the appropriate picture. To insert **clip art**, click the scroll bar, click below the table, and then click the Insert tab then click clip art.

D. Basic functions and formulas

Basic functions and formulae for word processors become operational when a table is selected.

E. Printing a word document

When printing a word document, you should do the following. First, open and preview the document. Secondly, open the **file tab** and then click on the **print option.**

"The participants should be taken through the printing options available in the print dialogue box. Hint layout, copies, print to file, sections, pages, collating.

Horace Mann

F: Assessment methods

Self assessment and practical tasks are some of the assessment methods that may be used to measure the competence of the participants.

Task 3

Divide the participants in groups of 5 and ask them to do the following:

a) Prepare the following documents for their subject area: lesson plan a class test with 3 multiple choice items.

b) Create a folder named **class 2** on the desk top

c) Save the lesson plan and the class test you prepared in the **class 2** folder.

Self-assessment

Pair up the participants. The participants should outline two ways in which they can use a word processor in teaching in the classroom. The pairs should then share and discuss with the rest.

Spreadsheets

Introduction:

A spreadsheet application is a computer programme such as Microsoft Office Excel. Spreadsheets are mainly used to organise and analyse data. It has built in features and tools to handle large amounts of data such as functions, formulas, charts, and data analysis tools. Examples of numerical data in a school that would require the use of spreadsheets is like:

Specific Objectives

By the end of the sub- module, the participant should be able to:

a. Identify the components of a spreadsheet.
b. Manipulate numerical data
c. Generate output forms
d. Print a spreadsheet.

A critical mistake is choosing the tool and then finding an educational activity to match it. (UNESCO ICT competency framework for Teachers ver2)

Task 1

a. Components of a spreadsheet

Note: Take the learners through the basic components of a spread sheet.

Hint: Columns, Rows, Cells, RANGE

B. Numerical data in spreadsheets:

Task 2

A teacher administered tests to her learners and presented the results in form of a table. Attempt the following questions in groups of five and then present your answers in form of a PowerPoint to the whole group.

1. Use word processing software and with the aid of screenshots and textboxes write the steps the teacher would take to open a word document and make the table given below. Use font 12, style Times new roman, 1.5 spacing.
2. Sort the learners using total marks scored in ascending order
3. Save as a template and print.

Name of Student		Adm. No.	Percentage score per subject				
			Kiswahili	Science	English	Math.	Music
1	Mueni Musyoka	K2440	72	56	86	80	89
2	Milka Aluoch	K2441	66	76	75	67	72
3	Stella Davidson	K2442	70	74	91	71	70
4	Margaret Kagia	K2443	78	72	88	67	80
5	Anne Mwikali	K2444	62	90	64	77	85
6	Roselyn Chacha	K2445	70	76	72	87	68
7	Magdalene Bosibori	K2446	62	78	80	82	79
8	Amina Daldo	K2447	76	77	89	93	75
9	Yvone Yunis	K2448	80	56	67	96	83
10	Samantha Oduor	K2449	55	64	78	72	69
11	Annette Kariuki	K2453	79	81	63	70	87
12	Janet Wafula	K2454	84	80	79	85	91

C. Print a spreadsheet.

To print spreadsheet data, you should ensure that the Excel file containing the data is opened. Before you print the data, you may need to adjust certain settings in the print dialogue box.

Note: Spreadsheets have extra printing options in the form of the target print area. Show the participants how to print work sheets workbooks and pages.

Task 3

Divide the participants into groups of five and instruct them to do the following:

- create a mark sheet using Excel
- Make a power point presentation and display their mark sheet to the whole class.

Hint:

- Selecting Cells, Rows, and Columns
- Using Worksheets
- Adding data and Working with formulas
- Using charts

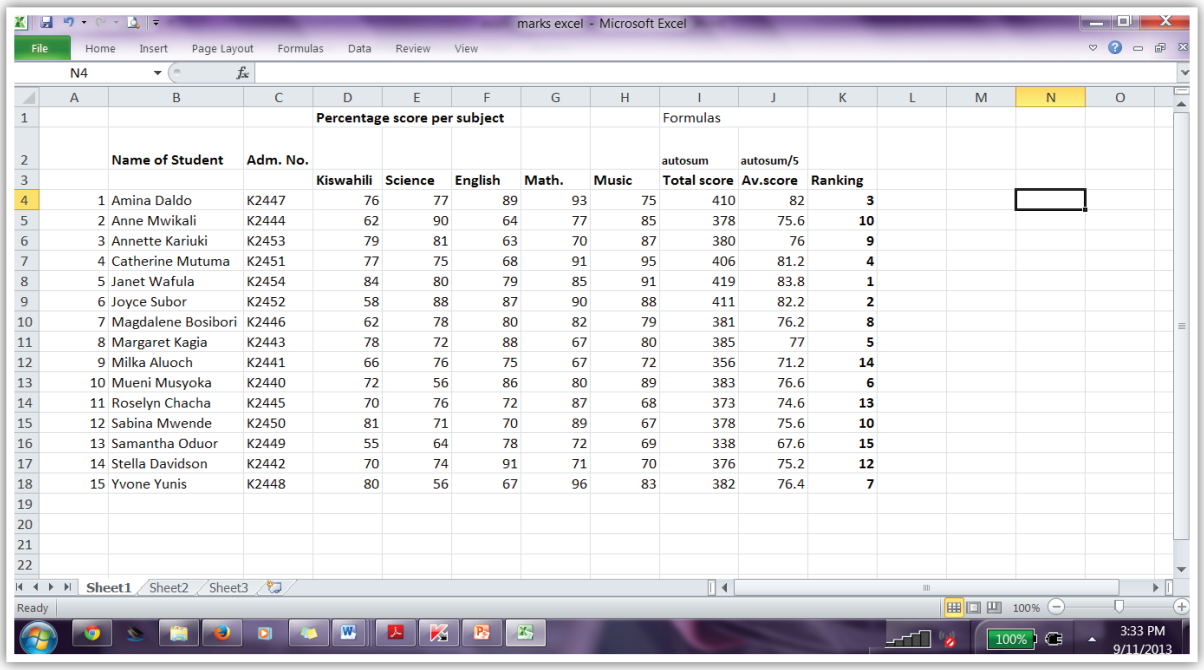
Mark book

Many teachers keep track of their learners' assessment in mark books. Typically, teachers record the scores for different assignments and then compute the learners' scores in a given subject area using a calculator. How would you be able to use a computer to make this process easier?

Plan It

Write your ideas on a sheet of paper and draw a table that shows how you might put the information in order.

1. What school subjects / learning areas do you teach? Pick one class for your mark book worksheet.
2. How would you organize the information so it is easy to read and understand?
3. Create your own **mark sheet** - one which you will find useful as displayed in the following example:



			Percentage score per subject					Formulas				
	Name of Student	Adm. No.						autosum	autosum/5			
			Kiswahili	Science	English	Math.	Music	Total score	Av.score	Ranking		
1	Amina Daldo	K2447	76	77	89	93	75	410	82	3		
2	Anne Mwikali	K2444	62	90	64	77	85	378	75.6	10		
3	Annette Kariuki	K2453	79	81	63	70	87	380	76	9		
4	Catherine Mutuma	K2451	77	75	68	91	95	406	81.2	4		
5	Janet Wafula	K2454	84	80	79	85	91	419	83.8	1		
6	Joyce Subor	K2452	58	88	87	90	88	411	82.2	2		
7	Magdalene Bosibori	K2446	62	78	80	82	79	381	76.2	8		
8	Margaret Kagia	K2443	78	72	88	67	80	385	77	5		
9	Milka Aluoch	K2441	66	76	75	67	72	356	71.2	14		
10	Mueni Musyoka	K2440	72	56	86	80	89	383	76.6	6		
11	Roselyn Chacha	K2445	70	76	72	87	68	373	74.6	13		
12	Sabina Mwende	K2450	81	71	70	89	67	378	75.6	10		
13	Samantha Oduor	K2449	55	64	78	72	69	338	67.6	15		
14	Stella Davidson	K2442	70	74	91	71	70	376	75.2	12		
15	Yvone Yunis	K2448	80	56	67	96	83	382	76.4	7		

Review It

Task 4

Create a mark sheet for ten pupils for an English test and ensure it has the following:

- A title that explains the type of information in the worksheet
- The names of learners sorted in alphabetical order
- Formulas that calculate each learner 's total score and average score

Hint: Use the replication tool for the formula by dragging

- Rank them based on the total score
- Generate a bar chart to display the results

Remember to save your work when you have finished.

Reflection:

- ***How will this mark sheet improve your ability to calculate your learners' grades? How would you modify the spreadsheet you created today for your own use?***
- ***For what types of activities would you use a spreadsheet's sum and average functions?***
- ***What is the most useful spreadsheet feature that you used today? Why?***

Match each of the functions below with the appropriate feature.

Task

1. Using ___, you can select different commands in a programme.	a. TITLE BAR
2. Vertical and horizontal bars located at the side or at the bottom of the display area used to move to a specific location in the work area.	b. MINI TOOLBAR
3. What appears when you select text in a document?	c. POINTER
4. You resize the document window by using options from the_____.	d. ENTER
5. Pressing _____ends one line of text.	e. SCROLL BARS

Presentation programmes

Introduction:

A presentation programme helps you create visual presentations and incorporate a variety of media, such as text, graphics, charts, and video, into a single presentation. The programme displays information in the form of a slide show. It has three major functions: an editor that allows text to be inserted and formatted, a method for inserting and manipulating graphic images, and a slide-show system to display the content. To use a presentation programme, you may sometimes need to use a projector so that the presentation can be viewed by everyone.

Specific Objectives

By the end of the sub- module, the participant should be able to:

a. identify the basic components of a presentation programme
b. determine the uses of components of a presentation programme
c. create a presentation
d. Print a presentation.

A common mistake is not persevering despite initial mistakes. (UNESCO ICT competency framework for Teachers) ver2)

A. Features of a presentation programme interface

Note: Take the participants through the various components of a presentation programme and use them in the activities for practice.

Task

Divide the participant in groups of three. They should pick the exam analysis done in the spread sheet exercise and create a slide show for the upcoming parents meeting.

The slides should have:

PowerPoint Themes - Choose from several predesigned themes or create your own.

Slides-Apply text, graphics, images and sound to each slide to help convey your message to parents. Display the slides as part of a timed show or cycle through them with a click.

Animations and Transitions- Add animations to items within each slide. Adding transitions provides a smooth flow from slide to slide.

Images and Graphics- Images and graphics help to communicate your message to the parents on the exam performance.

Note: take the participants through the steps for creating master slides for creating universal changes and numbering of slides.

A rule to consider for a PowerPoint presentation should be 6 by7 i.e. 6 rows 7 words per slide

D. Printing presentation

Slides can be printed in terms of number of slides per page or Notes pages of outline view.

Note: please take the participants through the different print previews for the three outputs for clarity.

Self-assessment - Multimedia presentation

You can use this as a checklist for your computer skills development:

	Description	Successful	Done with support	Learning	To learn
1	Start Microsoft PowerPoint				
2	Create a slide show				
3	Save the slide show				
4	Draw diagrams on a slide				
5	Insert a sound file or a movie clip				
6	Insert action buttons				
7	Insert a hyperlink				
8	Present the slide show to an audience				

Interactive Data Journal programmes

Introduction

A journal is a daily record of events or business. It is a summary of your most intimate thoughts, or simply a way to keep yourself on track while you complete an assignment. A computer programme that allows the user to make daily or periodic entries about their lives is referred to as a journal. In ICT, journals are software programmes that enable these entries which can be of data, graphics and other multimedia. Journal programmes include RedNotebook, Dropbox, Google docs, Evernote, Microsoft docs for Facebook and Windows live Skydrive

Specific Objectives

By the end of the sub module unit, the course participant should be able to:

a. identify the basic components of a data journal programme
b. use components to manipulate data in journal programme
c. create an e-diary using a data journal programme
d. Share data through data journal programme.

Electronic tools (laptop, ipad and a tablet used for creating and saving storing documents in a journal

A. Basic Components of a data journal programme

Task:

Initiate a class discussion on journals and demonstrate to the learners how to use a search engine to download and install a journal programme in their computer. Ask the participants to do the following in groups.

- identify the components of any one of the downloaded programmes
- make entries in the journals they have downloaded.

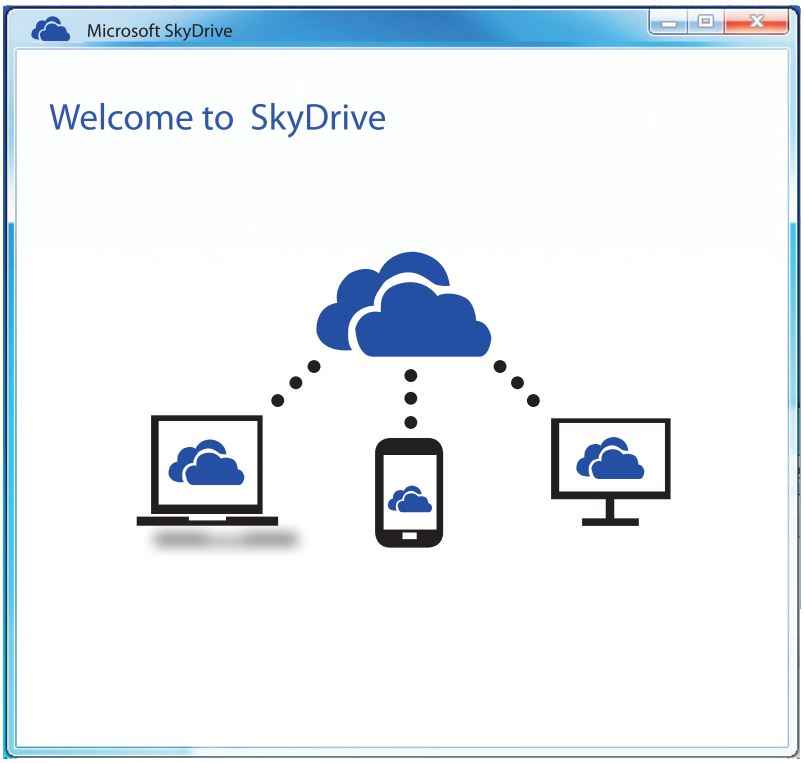
Sample Journal

Components:

- Data Capture- capture data from electronic documents from various sources such as network/local folders and PC desktop
- Web Authorization Service
- sharing link- for an uploaded file
- online accessibility
- multiple user accessibility
- storage service
- Mobile access.

B. Functions of a Journal Program

A journal program can be used as a tool for self-evaluation and self-improvement; the documents can be continuously accessed and improved with ability to be accessed by multiple users.



Retrieved from: http://www.pcmag.com/article2/0,2817,2409155,00.asp

Task 2

Divide the learners in small groups and ask them to do the following:

Prepare lesson plans or maths English and social studies and upload the lesson plans in either Dropbox or Google Docs.

C. Creating an e-Diary

A personalized electronic Journal is called an e- Diary. Some of the journaling tools include Word, OneNote, Evernote and WordPress. While these allow you to create an e-diary, some electronic diaries are downloadable for use e.g. myDiary

Task 3

a) Search and download one free e-diary utility from the internet

b) What advantages does an e diary have over the traditional hand written one?

Hint: The participants can create a lesson plan and share it on Google drive as a simple way of collaboration. They may also start an open blog and post some topical issues.

Principals of good Journaling

- Find something that can become your journal
- Set up a routine
- Chose a setting that's conducive to writing
- Date your entry
- Start writing
- Be creative
- Know when to stop
- Reread what you've written if you can
- Keep writing

Official Journaling

- Understand the assignment
- Stick to a schedule.
- Date each entry
- Start writing the entry
- Write in first-person.
- Make sure each entry is long enough
- Conclude each entry with a closing thought

D. Sharing Data

Data sharing is the practice of making data available to others. The sharing can either be regulated where access is limited or open where anybody is allowed access

Retrieved from: http://www.perftesting.co.uk/synchronising-access-to-the-facilita-shared-data-server/2011/09/28/

Task 4

Instruct the participants to do the following:

- Make journal entries in their notebooks and then transfer the entries into an e journal on your computer.
- Share their experience about e journaling with the other participants.

Task on application programmes

Task 5

Let the participants perform the following tasks:

1. Write an official cover letter to the county education office presenting last year's KCPE top 10 pupils
2. Insert one photo of the best pupil.
3. Prepare a spread sheet/excel document with a table showing the names, marks, and grades score
4. Calculate the average, overall merit, subject performance, graph and trend
5. Present the above information in a parents meeting on PowerPoint
6. Using Google drive, Skydrive or Dropbox, post some of your documents and share with two colleagues.

Summary

Applications programs are productivity tools designed for specific tasks.

Sub Module 5: Accessibility Tools

Introduction

Learners with disabilities often encounter challenges in learning environments. With these challenges there is need to ensure persons *with disabilities* (PWD) are adequately provided with enabling learning environments. Teachers need to increasingly be able to *customise* technologies and content for varying *student needs. Some of these tools* including assistive technology to allow *learners* greater independence in learning. Assistive technology is any kind of technology and/or tool that can be used to enhance the functional independence of a person with a disability.

Specific Objectives

By the end of the sub module unit, the course participant should be able to:

a. Customise a system to make it more accessible to learners with special needs.

b. Adapt teaching materials to make them more accessible to all learners.

Task 1

Divide the course participants into small groups and let them discuss the following:

(i) Identify 3 categories of PWDs.

(ii) For each category, state what kind of assistance they may need to be able to effectively use ICTs in teaching and learning?

Hint:

- Ease of access
- Simplicity of programmes
- Simplicity of use
- Communication enhancement
- Built-in zoom and high contrast display
- Dictation ability
- Instant Response

Customising a system

Ease of access centre

The ease of access center is a central location that you can use to set up the accessibility settings and programmes available in windows;

Task 2

Hands-on activity

Let the course participants work individually on the following:

i) Click on the Microsoft start button and type 'ease of access centre' on the search programmes and files bar

ii) Explore the features in the Microsoft Windows ease of access centre by clicking on each of them

iii) Which feature do you think will be of of the greatest use to learners and teachers with disability?

Hint:

- Use the computer without a display
- Make the computer easier to see
- Use the computer without a mouse or keyboard
- Make the mouse easier to use
- Make the keyboard easier to use
- Use text and visual alternatives for sounds
- Make it easier to focus on reading and typing task

Ways to make a computer easier for learners to see

- Make everything appear larger
- Use the Magnifier
- Enlarge the mouse pointer
- Personalize the color theme
- Zoom in on the web

Ways to make a computer easier for learners to hear

- Increase the volume
- Use headphones to decrease background noise
- Change the sounds on the PC
- Use text or visual alternatives to sounds

Assistive technologies

A number of assistive technologies are available for PWD. These include both software and hardware.

-*Word prediction software programs*: Allow the user to select a desired word from an on-screen list in a prediction window.

-*Reading tools and learning disabilities software programs*: designed to make text-based materials more accessible for people who struggle with reading (scanning, reformatting, navigating, or speaking text out loud)

- Telecommunication Devices for the Deaf
- Live Speech Captioning
- Screen Readers
- Braille Note takers
- iPa*ds and Tablets*

Summary

Technology can make the educational environment more accessible to learners, teachers and staff with disability. To meet the needs of learners with disabilities within regular classrooms, teachers require training on how technology can be used to overcome these challenges.

Many of the disabling effects of impairments can be reduced if children have the opportunity to experience a range of environments that minimize the impact of impairment. UNESCO, 2009

Working together, parents, teachers, administrators, and school management members, as well as both learners with disabilities and their nondisabled peers, can help create classroom environments in which all learners have opportunities to learn.

Sub Module 6: Internet Access and Use

Introduction

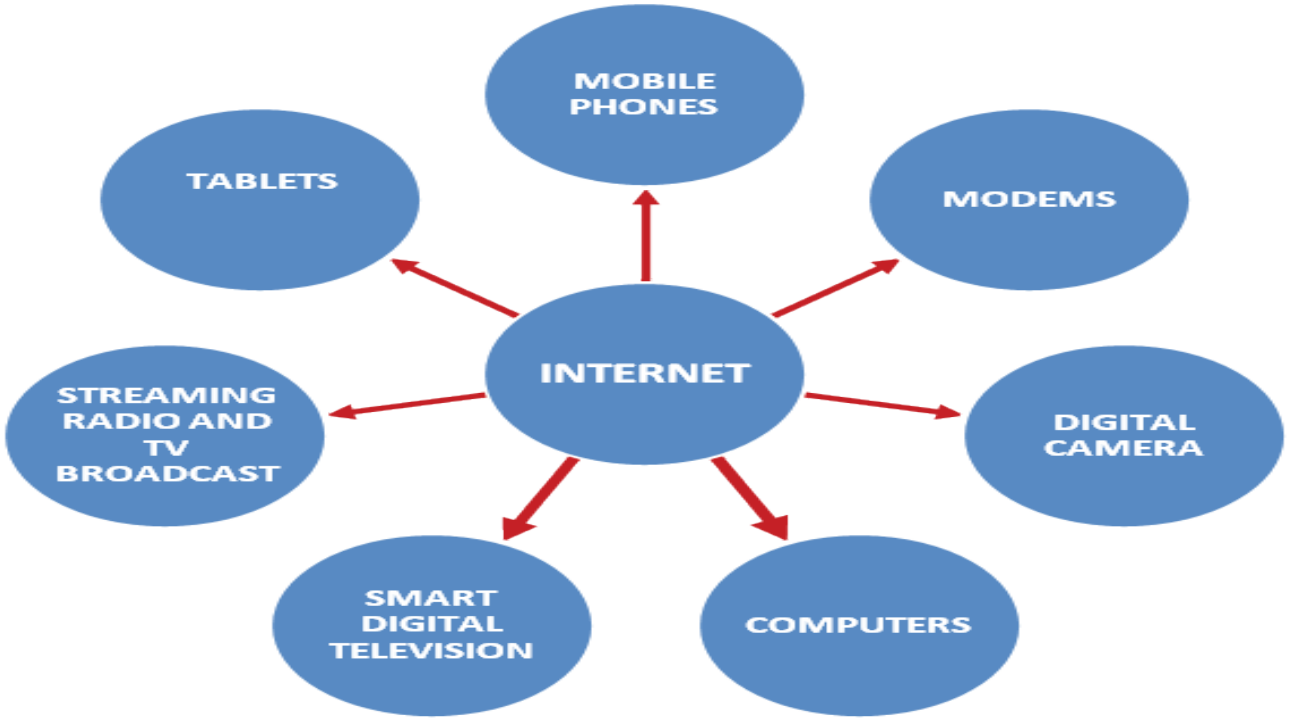
The Internet is a worldwide computer network, which interconnects computer networks across countries. World-Wide Web (WWW) provides Internet users with a uniform and convenient means of accessing the wide variety of resources (pictures, text, data, sound, and video) available on the Internet.

In this sub-module we will identify and access online resources for use in teaching and learning. It will also enhance acquisition of skills on developing and sharing of online teaching and learning resources.

Specific Objectives:

a. Identify online resources for use in teaching and learning
b. Access online resources for use in teaching and learning
c. Develop online integrated teaching and learning activities
d. Share online teaching and learning resources.

Internet access



Internet can be accessed through the following tools.

Task 1

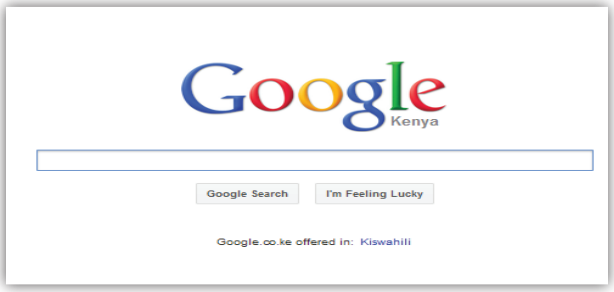
Lead the course participants in sharing ideas on what they have used the internet for. Write down all the ideas from the participants and guide them in understanding the uses of the internet.

Internet use in teaching and learning

Research purposes:

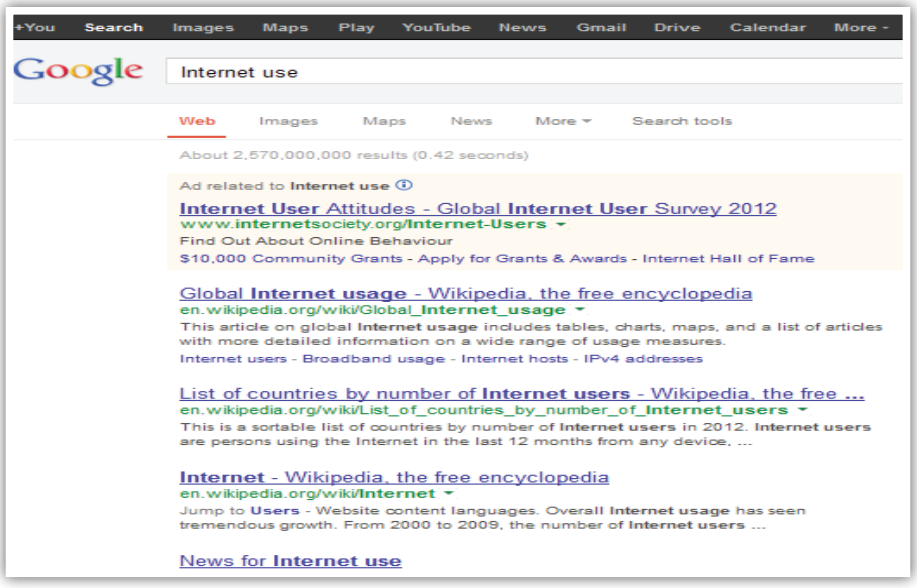
How to use the internet for research purposes

a. **Select a search engine**. At the top of any page on your computer, type the phrase "search engines" into the Search Bar to attain access to several different internet sites that specifically aid in searching. For example



b. Choose a few of the most specific or relevant keywords or phrases to describe your topic. Utilize synonyms. Type your choice of words into the Search Bar offered by your chosen search engine and press on the enter key

c. Assess your results. Search through your list of web pages to pinpoint information.



Task 2

You are planning to travel to Zimbabwe for a family vacation. Use the internet to look for information on the major tourist attractions in this country.

Lead the participants to research for this information and write one paragraph on the findings.

- Identify a search engine
- Identify the key words
- Assess the options
- Extract the required information

Communication purposes: The Internet is a channel for communication through

a. Email (electronic mail) is communication through the electronic communications system. Through email, messages are typed, sent, stored on ones computer, and retrieved. A message can be composed and sent to multiple addresses, and messages that are received can be forwarded on to new recipients. For educational purposes, email has been an important tool by which teachers at the different levels and parents can keep communication lines open. It has also helped learners maintain a closer contact with teachers at all levels of education.

Sending and receiving emails

Task 3

Lead the participants to create , send and receive emails. Guide them through these steps.

- Composing an email
- Attaching documents
- Sending email
- Responding to emails

b) Instant messaging

This is another tool with which to communicate online. Instant messaging, or IM, is more instantaneous than email. With IM, a user maintains a list of people with whom they to communicate to, called her buddy list. Some example are:

- Windows live messenger,
- yahoo messenger,
- google talk

Task 4

Lead the participants to use the instant messaging tool. Guide them through these steps.

- Register/log in with the messaging tool
- Sending and replying messages on messenger
- Sending images through messenger

Instant messaging can also be set up to work like a phone. Most cell phones are capable of sending instant messages.

c) Asynchronous discussion

This is an educational online tool by which instructors and learners can interact via discussions without the constraints of time and classrooms.

Task 5

Lead the participants to identify a discussion forum. Guide them in:

- Identifying communication tools
- Participating in the discussion forum

Collaboration and brainstorming tools

this is a wide ranging category of tools that include thought-organizing tools like mind mapping and collaborative tools like web based interactive whiteboards. Others tools that may be included in this list include wikis and virtual worlds. Many of these tools are used to transform how teachers teach and how learners learn.

Tool category and example	Function
Blogging (Blogger, Livejournal, Typepad, Wordpress, etc.)	Blogging allows learners and educators to post written thoughts to a website. The blogger can write on any subject to be viewed and commented on by viewers including multimedia files.
Digital Storytelling (Myne, prezi,Piki wiki etc.)	Digital storytelling uses digital multimedia to engage in the age-old art of storytelling.
Wikis (Wikispaces,Wikipedia etc.)	A Wiki is a series of web pages that, once created, can be edited and maintained by multiple users, typically as a long-term knowledge repository or database. It is usually devoted to a specific subject or field of interest.
Online Surveys (Survey monkey, survey gizmo, Zoomerang etc.)	Online surveys gather opinions easily with minimal technical knowledge.
Podcasting	A podcast is a digital audio or video file that is intermittent, subscribed and automatically downloadable program when new content is added.
Photo and Video Sharing(YouTube)	Photo and video sharing services include archival descriptions with capabilities varying from site to site and often include a tremendous amount of quality educational content.
Learning Management Systems (Moodle, Blackboard, Dokeos etc.)	Learning management systems include free and open-source resources that deliver, track, and manage online learning e.g www. elimika.ac.ke,
Social Bookmarking (Propeller, Linksmarker, Del.icio.us)	Social bookmarking sites store and allow users to comment on favorite Web resources and share them with others.
Social Networking sites (Facebook, twitter, yahoo chat etc.)	Social networking enables dynamic interaction among people when they work together on common goals. Social networks provide a variety of ways for users to interact.

Educational Online resources

Online resources refers to a wide range of information available on the internet including text, images, videos, cases studies, journals, databases and curriculum. There are many different digital formats for online resources including websites, audio and video podcasts, PDF files, ebooks, interactive learning objects, digital tools for creating resources etc.

There are many benefits that using online resources can bring to teaching and learning including access to information from many different voices and experts, save time, share your expertise with others, learners can take active role in finding and sharing course resources, resources are always available and there is equity and accessibility.

Open educational resources (OER)

These are a wealth of credible learning resources for all levels of learning that have been made available to the world for free. OER covers many different subject areas, and include a wide variety of learning materials such as curricula, lectures, interactive learning objects, professional development materials.

Task 6

Registering and using the available online educational resources: Visit the following websites and register for the online educational resources there.

Professional teacher devt: like learning management system- Elimika, elimuportal,

Teacher Online Services

- Updated information on website www.tsc.go.ke
- online teacher registration www.teachersonline.go.ke
- online pay slips
- online application and tracking of promotion results,
- online update of profile biodata

Summary

The internet is much more than an access to websites. In deed it has a wealth of information and knowledge on all fields of education. Internet resources can support learners and teachers in all disciplines.

Sub Module 7: Basic Support and Maintenance

Introduction

The sub module unit covers content on basic ICT problems, how to solve them and how to provide basic support to the ICT users. It equips the course participants with skills and competences to identify basic problems, solve the problems and provide support to other ICT users. Successful learners will be able to provide basic maintenance on the ICT devices to keep them appropriate functional order.

Specific objectives

By the end of the sub module the participant should be able to:

a. Identify basic ICT problems
b. Solve basic ICT problems
c. Provide support to ICT users

TEACHING AND LEARNING RESOURCES

Organise to have the following resources to enable acquisition of the intended skills:

- A computer for each group of participants to disassemble and reassemble. Groups should not be more than three participants; two is preferable.
- Containers for small parts, such as screws.
- Small screw drivers and any other tools necessary to open the computer chassis and remove components.
- Rubber or latex gloves that can be used to handle computer components if desired.
- Cables that connect to each port type for demonstration but you should demonstrate so participants can gain familiarity with the different types.
- The original manuals for the devices that you are working on.
- Bootable original OS DVDs

A: Identifying ICT problems: Basic troubleshooting

Checking Connections

Connection of cables between the computer and peripherals, or between a computer or peripheral and the power source should be emphasised as a first step to maintenance of ICT devices.

Task 1

Show the different types of cables and engage the participants in connecting them to their respective ports.

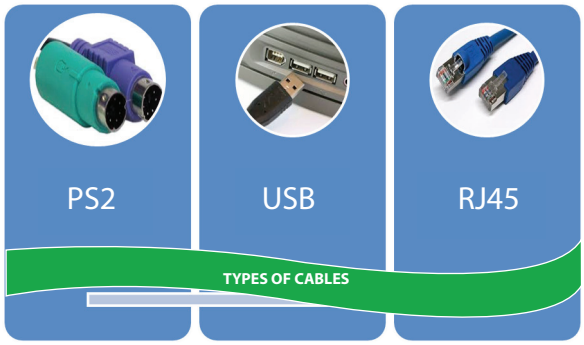
Hint : Male and female interfaces, serial and parallel types.

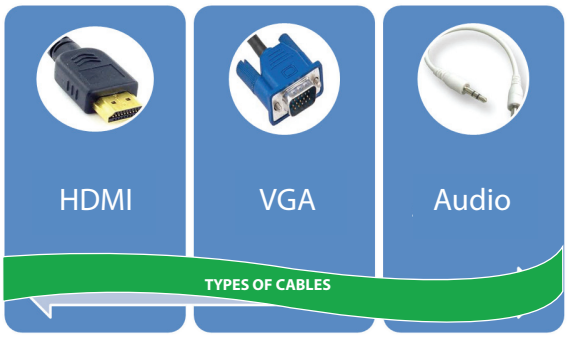
Discuss some of the available converters that can adapt the interfaces to different types.

Note:

1. Peripherals should be turned off before being connected to a computer or power source.
2. The computer should be shut down before any operations.

Cables: identification and connections





Task

Organise participants into work groups. Guide them in carrying out the following tasks:

- Identify different interphase ports and their respective cables.

Hint: devices to use in task 2 to include: Projector, external speakers, laptop, DVD laser.

Application of Device managers

Task 2

Use of Device Manager

Demonstrate how the device manager works. The demo should cover the adding and removal of new devices, drivers and conflic resolutions.

Hint:

Participants should perform the steps in this section after your demonstration. Open the device manager and take participants through the displayed components.

Show participants the different symbols that display if a component is not functioning.

Task 3

Required Devices: Preferably, use a printer, a projector, scanner, cell phone, external disk and digital camera. Identify symbols that display when a component is not functioning.

Hint: The devices can be shared in groups and participants take turn in setting them up.

Lead learners to discuss the plug and play feature which automatically detects some devices.

Highlight the need to install the missing **drivers incase plug and play does not** work.

Note:

Teach the wizards option as a recap of the lesson to impart the desired skills.

Updating and Rolling Back Drivers

Task 4

Lead the participants to discuss the four ways of finding device drivers.

Demonstrate how to go to Windows Update and to a manufacturer's Web site to find the device drivers.

Hints:

Enabling/disabling components

Adding drivers

Updating drivers

Rolling back drivers

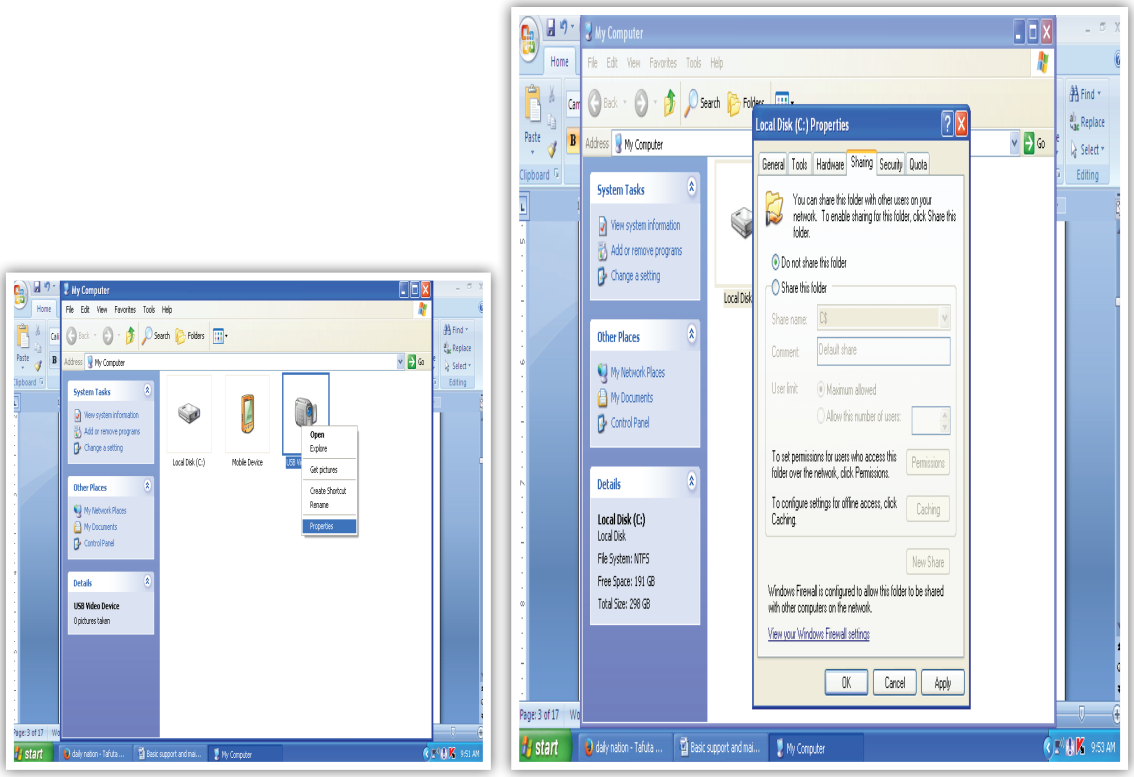
Setting Network /shared resources

Task 5

Guide the participants to set-up computer for basic sharing of resourses for optimal productivity. Preferably, allow them to share photos from a camera or phone.

Hint:

Hardware devices can be shared through open sharing or closed user group.



Note:

Participants should never configure any settings on the Resources tab of a dialogue box of a device unless they are well versed in the steps.

B: Solve basic ICT problems

Task 6

Ask for a volunteer participant to share any case scenario when a computer failed to start up.

Group the participants in fours and instruct them to identify at least two possible hardware/ software problems that may arise while starting up the computer and their possible solutions.

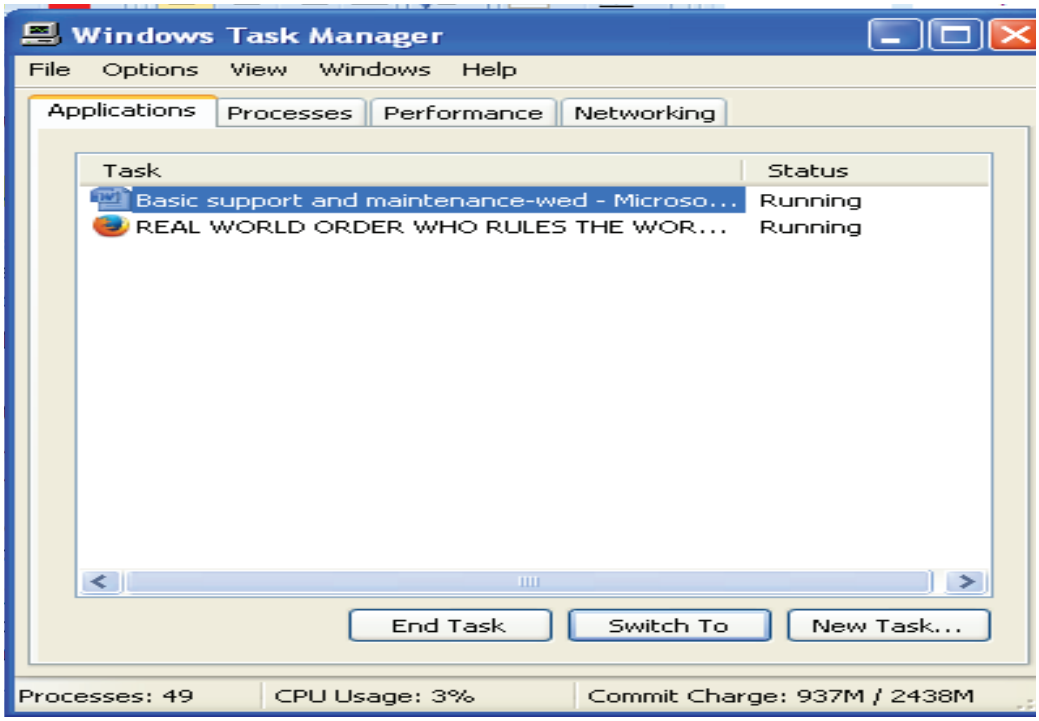
Hint: Operation System missing, Unbootable DVD or other storage device, Boot sector Virus.

The most common start up problems may be addressed using the following steps:

Case 1: The computer hangs (stops working) and the user loses control.

Solution:

Step1: Run the task managers. By pressing Ctrl+alt+del.



Step2: Look under applications for tasks whose status is 'not responding'.

Step3: Click on non responding tasks and select end task.

Step4: If the above approach does not work, restart the computer by pressing on the power button for about 10 seconds (long press). This is reffered to as warm booting.

Case 2: After a new software or hardware installation your system becomes unstable.

Solution: Start the computer in safe mode. *If the problem does not reoccur, the problem is not in the core services and drivers.*

Case 3: While working with your system you make configuration changes and the system becomes unstable. The computer stops responding and when you reboot, it does not start normally.

Solution: Start the computer as usual. *Press F8 repeatadly to get a startup menu. Select Last Known Good configuration.*

Note*: virus infections and boot sector corruption may prevent the computer from booting properly. The above solution may be applied to solve this.*

Case 4. To format the hard disk in preparation for a clean Operating system installation .

Boot the computer with the bootable Operating system DVD/CD and follow prompts.

You may use the repair option to recover the previous installation or Perfom a clean install.

Note:
Formatting leads to loss of data thus participants should never format a system unless under close supervision.

Case 5: Error prompts are displayed on the screen and you are not sure of the next course of action.

Solution: Always select escape or cancel when in a fix or stuck with a prompt you cannot handle.

Case 6: Start up errors

1. Check the power supply and the cables to ensure they are connected and working.
2. Remove battery and reinsert correctly
3. Start the machine to check whether everything is working
4. If the machine does not start up, contact a qualified technician as per the service level agreement (SLA) or warranty.

System Restore

System restore enables one to roll the operating system back to a previous state without losing any user data or settings.

Task 7

Demonstrate how to create a restore point.

Allow each participant to create a restore point.

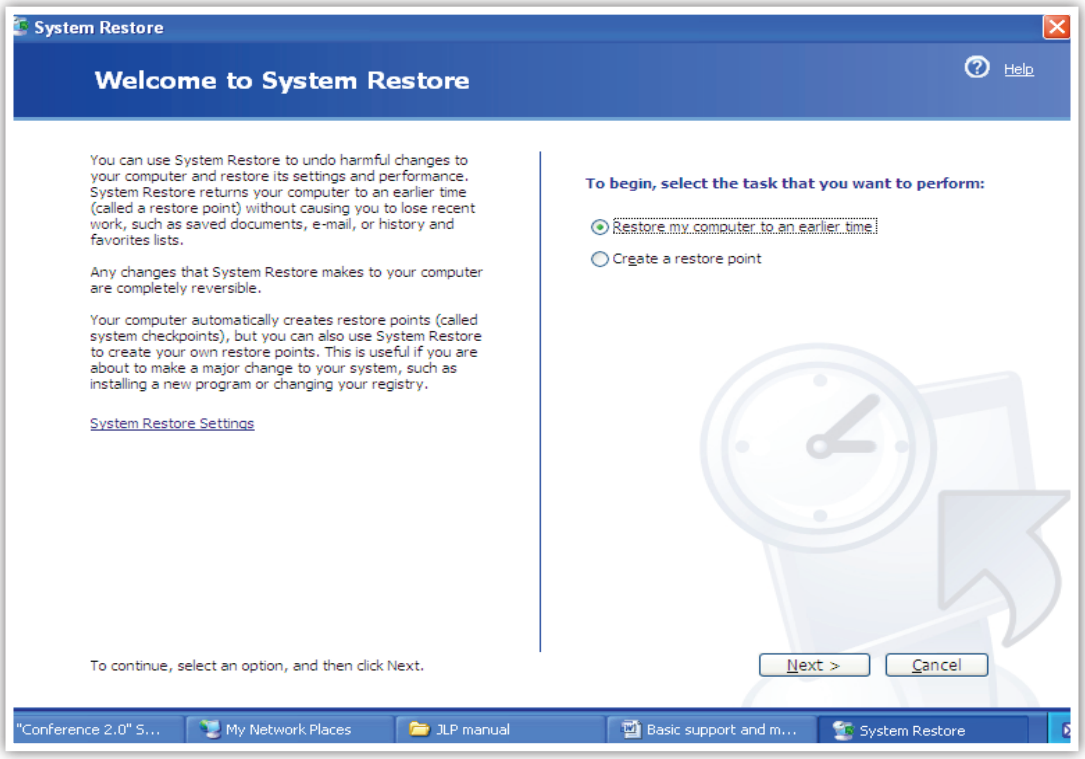


Figure 1 System Restore default prompt

Note:

Highlight the variuos restore points and the possibility of choosing any of the listed restore points.

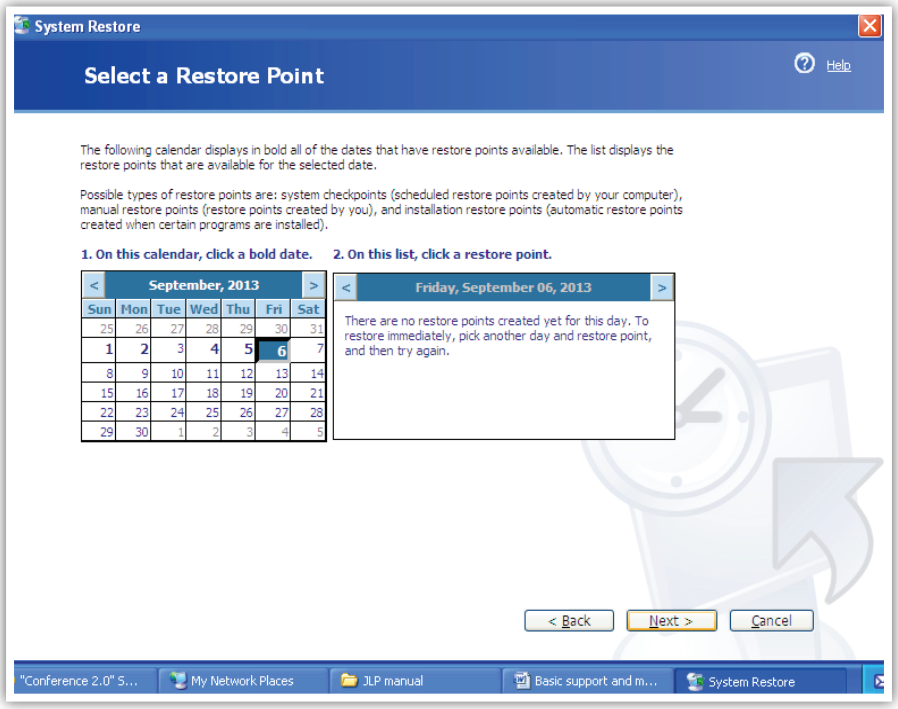


Figure 2 Restore points selection

Note: don't die with the problems; take an easy and meticulous approach to solving the technical problems. Do not work alone, its healthy and safe to work in teams. Seek assistance when in doubt.

C: Support to ICT users

Basic maintenance

It is important to maintain a good table which identifies the devices at hand and the timings for scheduled maintenance.

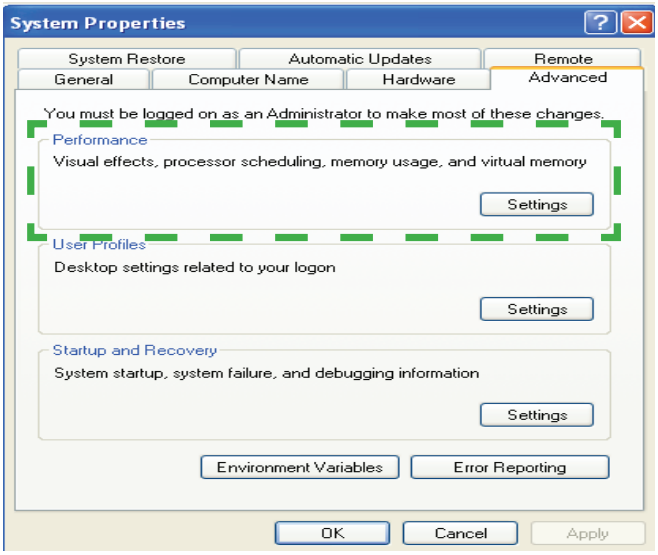
Task 8

Organise the participants in to work groups. Instruct them to list all the ICT devices available in their school catchment area.

Allow them to discuss the possible maintenance issues that may be required against the specified devices. Use tables in word processing to create the maintenance schedule.

Virtual RAM- paging

The computer system requires enough working memory (RAM) to work efficiently. To boost the existing RAM the operating system allots some space for the same. This is done under the computer properties.



Task 9

Organize participants into work groups. Guide them in carrying out the following task:

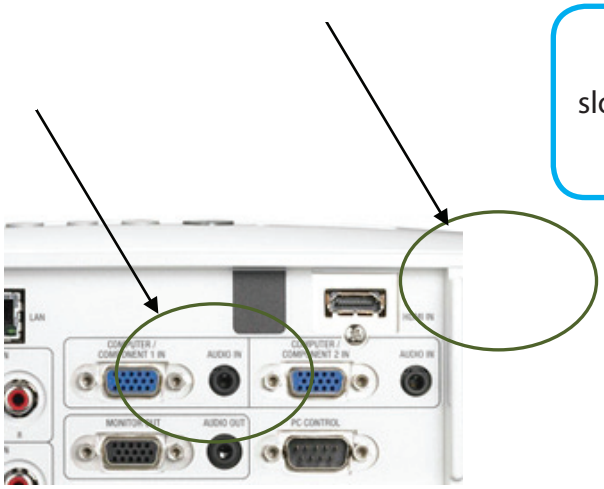
- Change virtual RAM size of a computer and note the size limits

Maintenance of LCD projector

The LCD is used to project content on a big screen or wall. It is appropriate for dissemination of content to a big audience. Maintenance implies to understanding the various LCD connection ports and using the appropriate cables.

High Density Multimedia Interface (HDMI) port

Video Graphics Array (VGA) port



Note: The VGA ports are slowly being replaced by the HDMI.

Figure 3High Density Multimedia Interface (HDMI) cable

Figure 4 Video Graphic Array (VGA) Cable

DVD and DVD drive

The DVD drive accommodates the digital content carrying media. Sometimes the drive cannot read the DVD due to some factors. Some of the factors include:

- *Dirt on the DVD*

To clean the DVD use a clean piece of cloth. Wipe from the centre outwards in straight lines turning the disc as you clean. If the dirt is persistent dub the piece of cloth with an alcohol solution before wiping. Let the disc air-dry for a second or two in an upright position. Avoid wiping in circles.

- *Dirt on DVD Lenses*

1. Open the DVD-ROM tray.
2. Keep the DVD-ROM tray open as you power down the computer. Unplug the power cable for your safety.
3. Dab a cotton swab in rubbing alcohol (a big sized ear bud can do as well).
4. Locate the laser lens in the tray. It is usually a tiny blue circular glass that is approximately 1mm wide.
5. Swipe the cotton swab over the lens. Do not apply pressure, and use short, gentle strokes. Power on the computer when finished.

Note: There are DVD lense cleaners in the market.

- *Scratches on the DVD*

1. Use toothpaste to polish out scratches. Be gentle when polishing the DVD with toothpaste.
2. Dab a pea-sized amount of toothpaste and a small amount of water onto the DVD. Rub the toothpaste and the water into the DVD with a clean finger or a microfiber cloth. Buff away any scratches that are visible.
3. Clean the DVD with a separate cloth and water. Wipe away any toothpaste still on the disc.
4. Avoid extra-whitening toothpastes and strong chemicals.

Note: When the DVD shows signs of damage it is advisable to create backup when you are able to access the data after the above treatment.

Managing accidental spills on a computer

1. Shut off the computer
2. Remove the battery immediately.
3. Unplug the AC adaptor.
4. Unplug the device after the spill. The biggest danger at first is the device shorting out.
5. Disconnect and remove any external devices.
6. Turn it upside down immediately to stop the liquid from flowing deeper into the machine.
7. Clean up any part of the spill you can get using paper towels or any absorbent material that is lint-free.
8. Inspect the keyboard. Some keyboards are designed to protect the internals from liquids:
9. Wipe up anything sticky. This may include the screen, the keys on the keyboard, and any buttons. Use a clean, slightly dampened, lint-free cloth.
10. Dry naturally. Prop the machine up, away from surfaces, so that air can circulate in and around the entire unit.
11. Leave the machine to dry for 24 to 48 hours. While it is drying, place the laptop battery in a bowl of uncooked rice.
12. Seek professional help if the laptop does not restart.

General care tips for ICT equipment

- Clean the machine on the outside with a soft cloth using recommended solutions and blowing off dust from the system using a dust blower.
- Do not overcharge the batteries by leaving them too long on power.
- Use protective devices in the power line like UPS, Surge protectors and regulators to prevent damages that would occur from surges.
- Repair or replace malfunctioning parts.
- Maintain proper procedures of connecting peripheral devices.
- Handle the devices with a lot of care.

Summary Task

Conduct the participants in groups to carry out the following sub-tasks with the aim of projecting a presentation on the screen or wall:

1. Identify devices for making a presentation.
2. Identify the interface ports on the projector and the computer.
3. Connect the computer output to the projector input.
4. Check and manage the settings as displayed by either the computer or the projector.
5. Manage the output to the screen or wall: clearing focus, zooming, picture mute and colour settings to fit the needs of immediate environment.
6. Dissemble the presentation devices including the cables and remove storage discs like flashes or DVD.
7. Clean the devices appropriately.

Sub Module 8: Safety, Security and Ethics

Introduction

The emerging dominance of ICTs utilization has come with its own challenges in both moral and cultural dimensions. ICT facilities in a school should be used with integrity. There should be measures to ensure that programs, data, network and equipment are adequately protected against loss, misuse or abuse. This sub-module unit covers best practices in the use of ICTs. The unit covers safety of data and users as well as security and ethical issues in use of ICTs.

Specific objectives

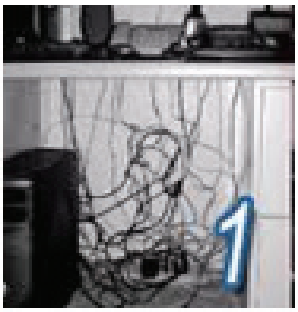
By the end of the topic, the course participant should be able to:

a. Identify safety procedures for using ICTs in teaching and learning
b. Identify security measures for ICTs infrastructure
c. Evaluate the ethical uses of ICTs in Teaching and learning.

Safety

The use of ICT can be dangerous if proper procedures are not in place. Safety precautions need to be taken to reduce the risk of accidents. Some of the common hazards and precautionary tips are:

Hazard	Safety issues and precautions
Hazardous chemicals used for cleaning 	• Accidental fires (most of the cleaning compounds are alcohol-based thus flammable), • poisoning • diseases **Safety tips** Hazardous chemicals should be kept safely away from reach.
Electrical hazards e.g. contact with live wires 	• Electrocution **Safety tips** • All electrical work should be undertaken by suitably qualified staff. • Electrical equipment should be safety tested at least once a year • Food and drink should not be placed near a machine

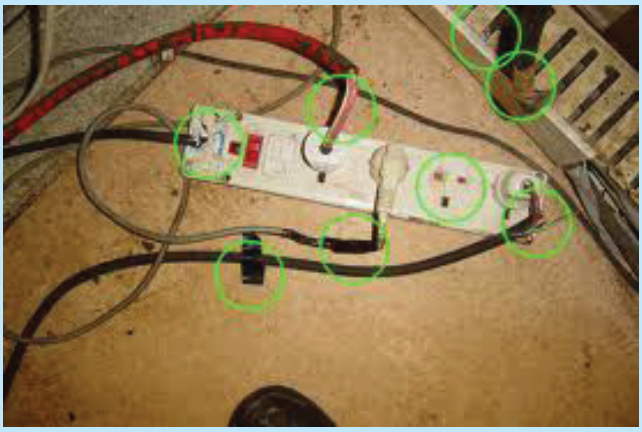
Jumbled layout of wires and cables  	Tripping and falling, hard to check in case of wrong connections. **Tips** • Orderly layout of cables and wires. Ensure there are no trailing wires across or around the room which people could trip on • Power cables must be carried in trunking that separates them from voice and data cables. • There should be adequate space around desks for people to move • Bags and obstacles should be stored out of the way so that people do not trip over them 
 **Overloaded sockets**	**FIRE** **Safety tips** • Electrical sockets should not be overloaded • Heating and ventilation should be suitable for the working environment • Work desks should be strong enough to support computers and equipment • Staff should follow the safety regulations • Fire extinguishers should be available, including specialist ones to deal with electrical fires. Carbon Dioxide fire extinguishers are ideal for fires involving electrical apparatus. • Fire exits should be clearly marked and free from clutter

In case of fire:

Do not panic → Walkout of the lab in an organize way → Switch off the main power supplies → Account for all the people. Call authorities

Task 1

Observe the picture and point out as many wrong things about the situation as you can.



Security measures

Security risks are bound to either slow production or shut down completely greatly affecting productivity. Some of the factors that can compromise security of data include:

Human error: e.g. entering incorrect transactions; failing to spot and correct errors; processing the wrong information; accidentally deleting data.

Technical errors: e.g. hardware that fails or software that crashes during transaction processing

Accidents and disasters: e.g. floods, fire

Fraud - deliberate attempts to corrupt or amend previously legitimate data and information

Commercial espionage: e.g. competitors deliberately gaining access to commercially-sensitive data.

Malicious damage: where an employee or other person deliberately sets out to destroy or damage data and systems.

Preventive Practices

Task 2

Divide the participants in groups of four. Guide them on a discussion on the four ways of preventive practices.

Hint: Passwords, Firewalls, Physical security, Inventory.

The discussion points to be shared on presentation slides.

Prevention: What can be done to prevent security accidents, errors and breaches? Physical security controls are a key part of prevention techniques, as are controls designed to ensure the integrity of data.

- **Using Firewalls**

  A firewall is a software program or piece of hardware that helps screen out hackers, viruses, and worms that try to reach your computer over the Internet.

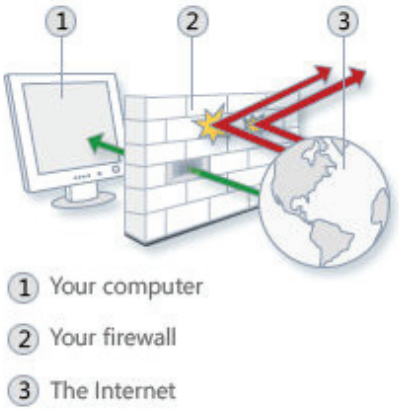


Figure 7 Firewall

Firewall protects against:

- Hackers; breaking into your computer.
- Worms – types of viruses that spread from computer to computer over the internet.
- Incoming and outgoing infected data.

Note: Antivirus software should be regularly updated

- Using Strong Passwords

Figure 6 Assorted Antivirus programmes

Task 3

Discuss why it is important not to use weak passwords. Demonstrate how to configure and enforce password complexity options.

A strong password is an important protection to help you have safer online transactions. Here are some steps to create a strong password. Consider using some or all to help protect you online:

- **Length.** Make your passwords at least eight (8) long.
- **Complexity.** Include a combination of at least three (3) upper and/or lowercase letters, punctuation, symbols, and numerals. The more variety of characters in your password, the better.
- **Variation.** Change your passwords often. Set an automatic reminder to update passwords on your email, banking, and credit card websites every three months.
- **Variety.** Do not use the same password for everything. Cyber criminals can steal passwords from websites that have poor security, and then use those same passwords to target more secure environments, such as banking websites.

Note: Facilitator to demonstrate examples of strong passwords

Inventory and Labeling of Hardware

Assign a portion of the assets to each participant, and have them complete the inventory.The inventory may consist of both hardware and software.

Task 4

Let groups of participants use a spreadsheet to create a simple hypothetical inventory of ICT equipment in their 'schools'.

Hint:The invetory should show computer model, peripheral devices attached, serial numbers, hard disc and RAM capacity .

Security measures

Security measure	Details	Examples
Detection	Spotting when things have gone wrong detection needs to be done as soon as possible - particularly if the information is commercially sensitive. Detection controls are often combined with prevention controls	• E.g. a log of all attempts to achieve unauthorized access to a network. • Do NOT open strange emails • Do not share your personal details.
Deterrence:	Deterrence controls are about discouraging potential security breaches.	• Register the people entering the e-class • Avoid welcoming strangers in the e-class • Use of alarms, motion detectors and smoke detectors  ***Motion detector***
Burglar proofing and security guards 	• Install security grills on doors and windows of rooms with ICT facilities and sensitive data storage • Engage security guards to guard the premises	• Guarding the e-class 

Task 5

Guide the participants on how to recover lost data using the recycle bin restore, system restore and auto recover.

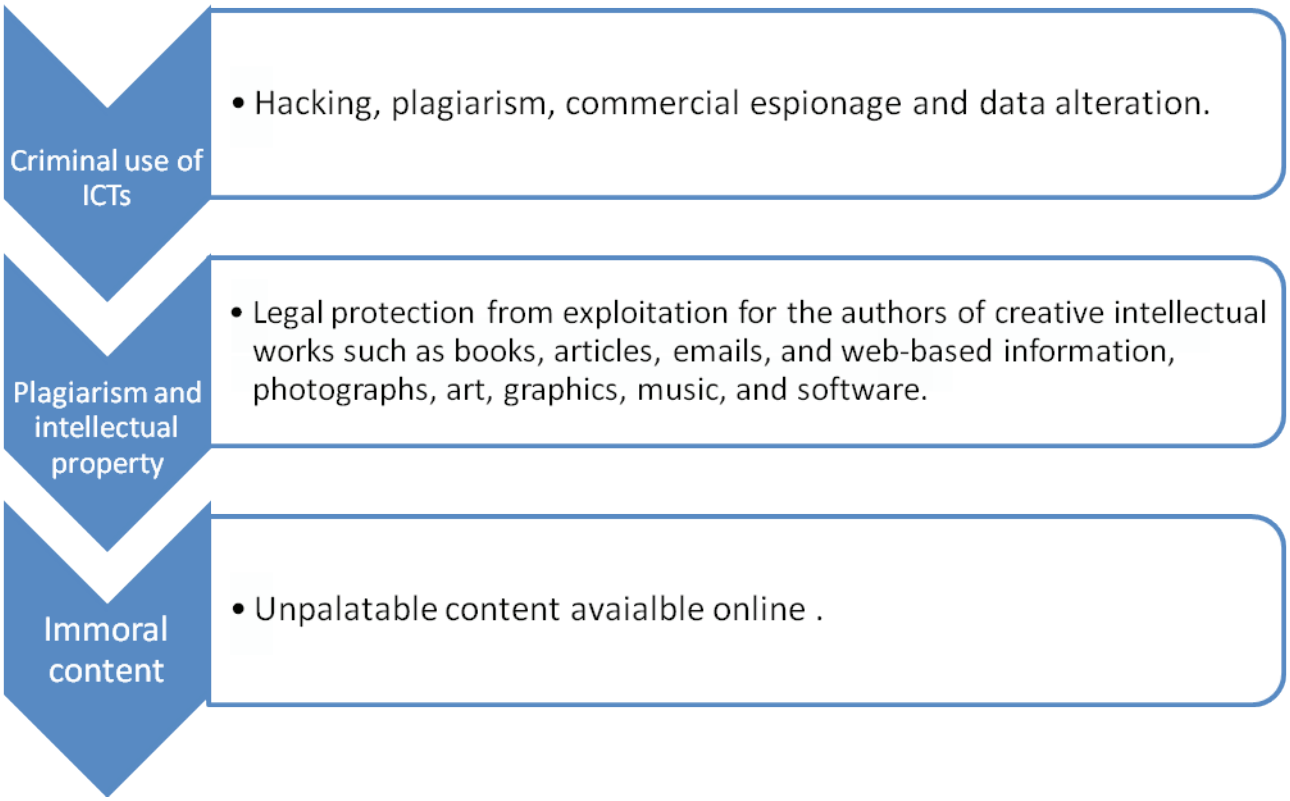
Discuss the availability of commercial data recovery tools that can be used to restore entire portions e.g. Norton Goback, icare.

Data recovery

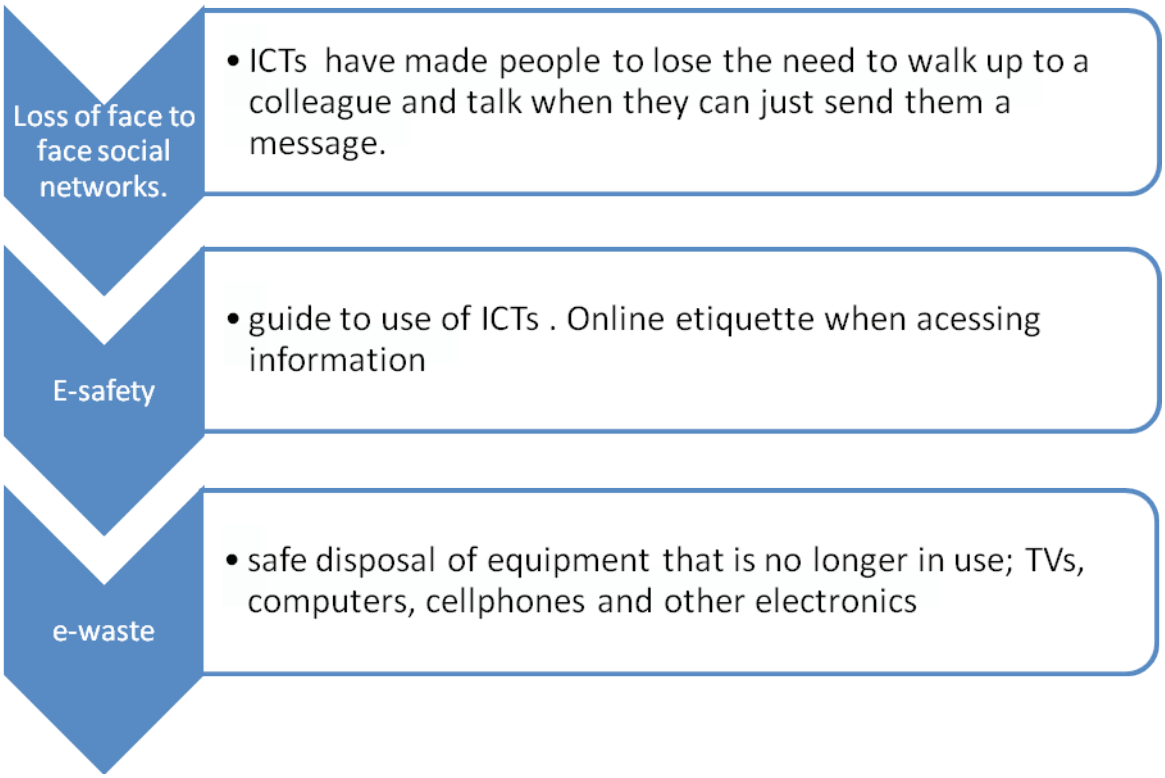
This involves strategies to recover data that has been corrupted or lost such as when hardware breaks down.

To avoid total loss of data it is important to have external backup such as flash discs, email storage and external hard discs.

Ethical issues



Other issues of concern



Definition of e-waste

E-waste comprises discarded televisions, computers, cell phones and other electronic devices. E-waste is the most rapidly growing problem in the waste stream due to its quantity and toxicity. Often, the toxic material is improperly disposed and thus poses a threat to human health and the environment.

Figure 11 Assorted electronic waste

Hazards associated with E-waste

Many elements of this waste contain poisonous substances such as lead, tin, mercury, cadmium and barium, which can cause diseases like cancer, birth defects, neurological disorders and respiratory disorders.

Management of E-waste in Kenya

Kenya now has the first E-Waste plants set up within Nairobi to recycle all types of e-waste and provide safe disposal of e-waste. Some of these include, Safaricom, CFSK and East Africa Compliant Recycling (EACR). They accept, dismantle and separate all e-waste components, not just the valuable resources. Plastics,

glass, batteries are all disposed in accordance with the highest international criteria while generating local income and employment opportunities.

Task 6

You have been apointed in the County Board of ICT integration. Outline the measure you would put in place to manage e-waste.

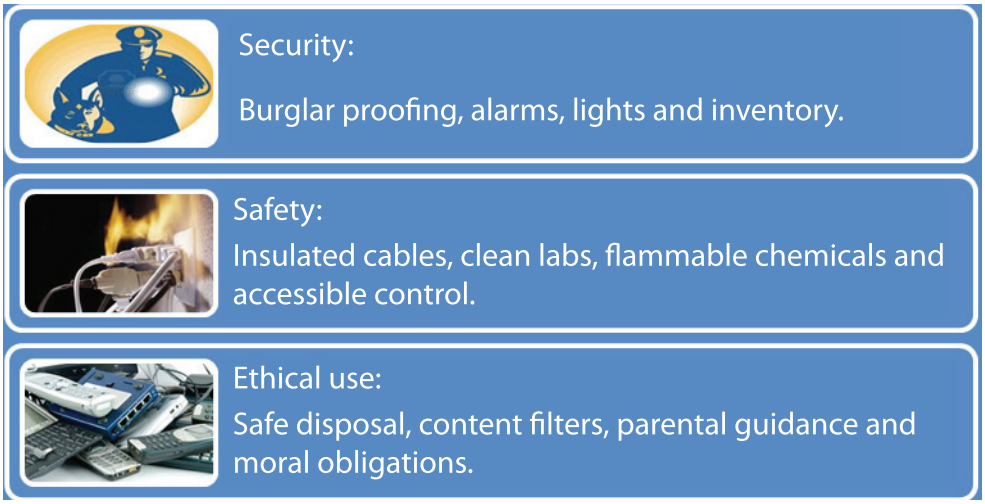
Hint: overage ICT equipment, disposal, shelf live and service level agreement.

E-Waste guidelines for schools

Schools are recipients of electrical and electronic goods. Unfortunately, most of the second hand products are not inspected before they are donated. Coupled with poor handling and use, their lifespan becomes shorter resulting in huge amounts of e-waste in most schools. In order to manage e-waste, learning institutions need to:

- Create awareness and conduct sensitisation campaigns on responsible e-waste management
- Develop memorandums of Understandings (MOUs) with recycling companies for take-back, recycling and re-furbishing of e-waste.
- Develop mechanisms to ensure that inspection certificates clearly specify end-of-life date and who bears responsibility thereafter
- Develop and mainstream e-waste education in the curricula
- Separate e-waste from other wastes to facilitate collection, treatment and recycling
- Dispose e-waste generated to the e-waste collection centres
- Sell or donate e-waste to licensed re-furbishers
- Take back equipment to the manufacturer, importer or assembler, if they allow it
- Dump e-waste at the licensed dumping site specified for the e-waste
- Be responsible by following recommended disposal methods or procedures especially dates of expiry or end of usage period of the product.

Summary



Module Three

ICT INTEGRATION IN TEACHING AND LEARNING

Sub Module 1: Change Management

Introduction

Change management may be defined as the transitioning of individuals, teams and organizations to a predetermined state. The sub module will also discuss the 21st century skills and their importance.

Specific Objectives

By the end of the sub module, the course participant should be able to:

a. Identify the 21st century skills
b. Outline the change management principles in teaching and learning
c. Discuss the change management process in teaching and learning
d. Determine methods of monitoring and evaluating the effectiveness of change.

Change management towards 21st century skills

Socially, the interactions of the 21st century differ from those of the 20th century in terms of manner, time or speed as well as in the context of occurrence. The traditional formal and casual interactions have been replaced by social media for instance. In addition, new occupations especially in the field of ICT have sprung up. Consequently, people require new skills in order to remain relevant socially, economically and even politically. These skills are referred to as the 21st century skills.

What are 21st century skills?

There are three broad 21st century skills each of which is made up of some sub skills. The broad skills are: learning and innovation, information, media and technology, as well as life and career skills. (Intel Teach ,2008)

21ST CENTURY SKILLS	
BROAD SKILL	SUB SKILL
Learning and innovation	• Creativity • Innovation • Critical thinking and problem solving • Communication and collaboration
Information, media and technology skills	• information literacy • social responsibility • ICT literacy
Life and career skills	• flexibility and adaptability • initiative and self direction • social and cross-cultural skills, • productivity and accountability • leadership and responsibility

Task 1

The three broad categories of 21st century skills are: Learning and innovation, life and innovation, information, media and technology as well as life and career skills.. Instruct the participants to attempt the following task in groups of five:

- Which among the three broad skills, do teachers require most?
- Rank the three broad skills in order of importance and give reasons for your answer.
- How can teachers help learners acquire 21st century skills?

Hint: None of the skills is more important than the other. Hence, guide the discussion along this line.

Principles of change management

Schools and teachers as agents of change should transform the society (Fullan, 2008). New materials, behaviour, practices and beliefs are the ingredients of change. Fullan outlines six steps which are necessary in order to effect change in a school.

STEPS OF EFFECTING CHANGE IN A SCHOOL	
Recognise and value your employees	Focus on teachers and staff, and learners and the community in the process of ICT integration.
Connect peers with purpose	Learners achievement improves when teachers work in learning communities supported by school leaders who focus on improvement.
Capacity building prevails	Teachers and school leaders develop instructional and management of change skills for school improvement through effective strategies.
Promotion of a learning culture	Fostering a school culture that supports day-to-day learning where teachers strive to improve leads to successful growth.
Transparency rules	Trainings and mentorship programmes can provide teachers with a chance to observe and be observed by others for better results.
Systems learn	Developing many leaders in a school and openness to new ideas are the factors that enhance the sustainability and continuity of change in schools.

Figure 3.1 shows the six steps which are cyclic in nature.

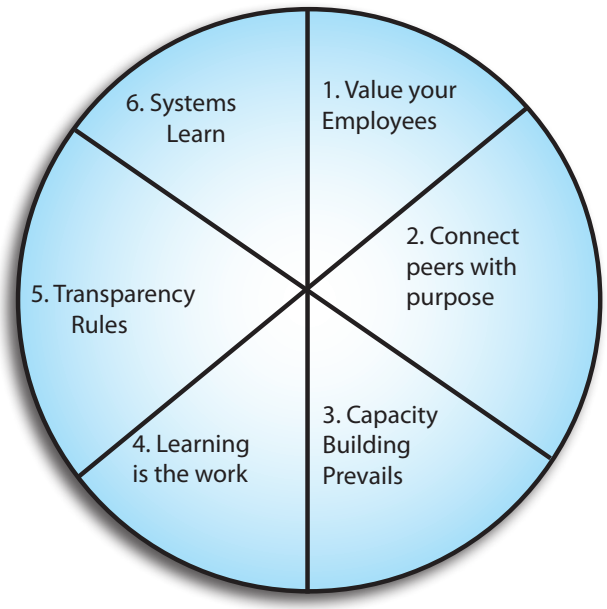


Figure 3.1 Fullan's model of effecting change in a school

Source: Fullan 2008a

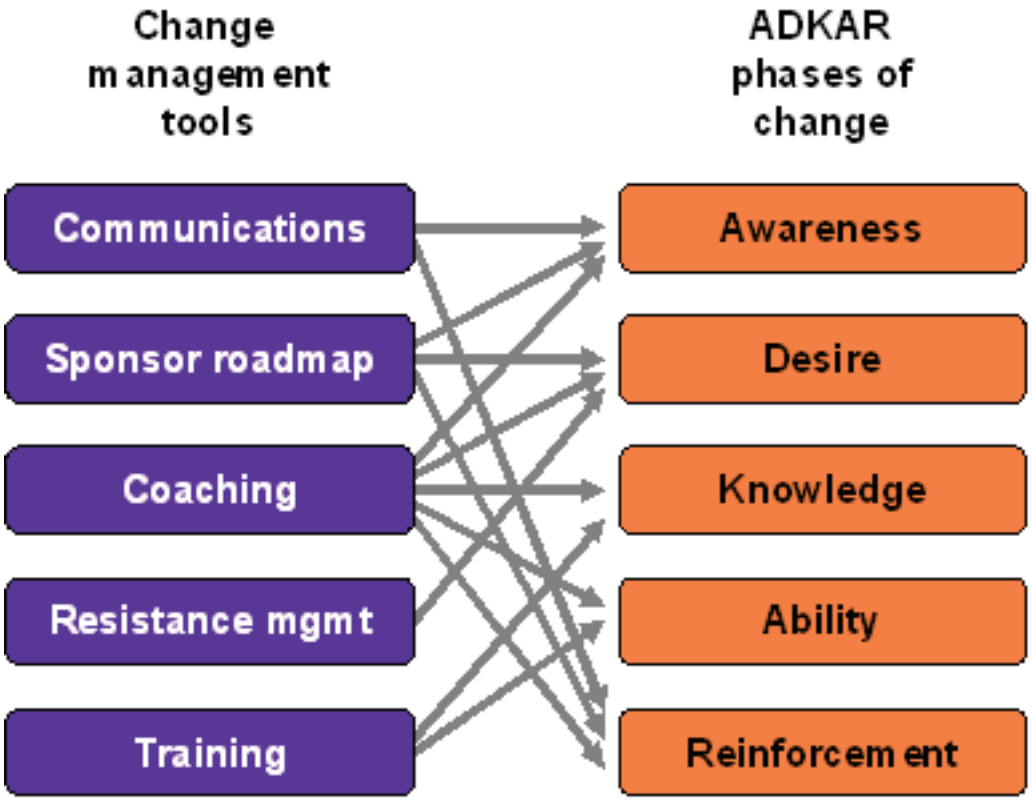
Task 2

Divide the course participants into six groups and instruct each group to discuss one of Fullan' s principles of effecting change in a school and how they would use it to ensure school with limited resources rolls out a successful ICT programme.

Allow the groups to share their ideas in plenary

N.B. Another model of change management is the Prosci model

It has 5 main stages: awareness, desire, knowledge, ability and reinforcement known as the ADKAR phases of change



Change management process

Change management is the institutional capacity to coordinate internal elements towards the destination illuminated by a visionary leadership. It also involves the assimilation of external resources or adaptation to contextual changes during its evolutional process (UNESCO, 2010).

Therefore, visionary leadership is key to institutional and management. According to Fullan (2008), visionary leadership involves:

- Careful entry into the new setting
- Listening to and learning from those who have been there longer
- Engaging in fact finding and joint problem solving

- Carefully diagnosing the situation
- Forthrightly addressing people's concerns
- Being enthusiastic, genuine and sincere about the change circumstances
- Obtaining buy-in for what needs fixing
- Developing a credible plan for making that fix

Summary

Creating a roadmap for change

After going through this module, teachers are expected to come up with personal schedules or transformation roadmaps for ICT uptake to remain committed to the process as the government supplies the necessary infrastructure. Teachers as communities of practice in the art of teaching, need to be agents of change as they undergo the change process themselves. They require benchmarks to guide their performance and regular training to improve their skills in ICT integration in teaching and learning.

Sub-Module 2: Steps Towards ICT Integration

Introduction

Human beings have continuously been improving the way they live by developing new technologies to assist them perform various chores efficiently. Presently, ICT is the driver of world systems from the home to industry. This sub module seeks to introduce changes in teaching and learning by empowering the sector to conceptualise importance of integration and identify effective approaches for ICT in education.

Specific Objectives

By the end of the sub module, the course participant should be able to:

a. Identify ICT tools for teaching and learning
b. Explain ICT integration and its importance in teaching and learning
c. Identify effective ICT approaches in teaching and learning.
d. Discuss how ICTs can be integrated in teaching and learning

A: ICT tools for teaching and learning

Information and communication technology (ICT) is a collection of tools, communication systems, software and hardware which are used for storing, transmitting, manipulating digital information into different forms. Common ICT tools include radios, televisions camcorders, digital cameras, CD-roms, DVDs, memory sticks (USB drives), computers mobile phones, mp3/mpv4 players and their related softwares and interfaces. The use of any one or several of these tools in the classroom for teaching and learning can be termed as integrating ICT in the classroom.

Task 1

Guide the participants to list as many tools as possible in their school that may be used for ICT integration. Highlight how the tools have been used in the teaching and learning process.

Allow the course participants to share some of their experiences.

B: Importance of ICT integration in teaching and learning

- ICT has been integrated virtually in all spheres of human activity. These include business, agriculture, medicine, education, teaching and learning and many more.
- Many social economic changes have been observed in the society in the last 100 years this calls for change in the teaching and learning process to ensure sourcing, sharing and dissemination of information in our education sector.
- ICT brings about some positive elements in technologies which should be appreciated in the early stages of the learners' life.

- Times change hence classroom practices and tools need to change because teaching is aimed at preparing learners to fit in a changing society.

Task 2

1. Guide the participants to discuss in small groups the challenges they anticipate in integrating ICT in the classroom.
2. Suggest how the challenges can be addressed effectively by participants in their current capacity?

Allow the groups to share the expected challenges

C: Approaches to Integration of ICTs in teaching and learning

ICT has touched virtually every facet of human existence. In view of this, ICT integration in teaching and learning is no longer an option. In primary schools, the areas in which ICT should be integrated are:language, science, mathematics, social studies and creative arts.

Task 3

Organize the participants into discussion groups to discuss the approaches they would take to integrate ICT in the teaching and learning process in a case school within their locality.
Allow the course participants to share their approaches in plenary.

Hint:

The approaches should include;
-the level of the learners
- the topic and concept to be taught
-the appropriate ICTs available to be used
-when and how to use the ICTs
-how to involve the learners
-how to evaluate the learning outcome

Task 4

Organise participants into task groups. Assign them to discuss and present the following task:

'A teacher in Twaweza primary school was going through the school photo repository so as to identify the photos that could be used in teaching and learning. She came across the following photos. In the spaces provided, assist the teacher to determine the possible subjects and

topics in which the photos could be used to prepare lessons.
Allow the course participants to share some of possible topics that can be taught using the photos.

Photo of The titanic ship sinking in the sea

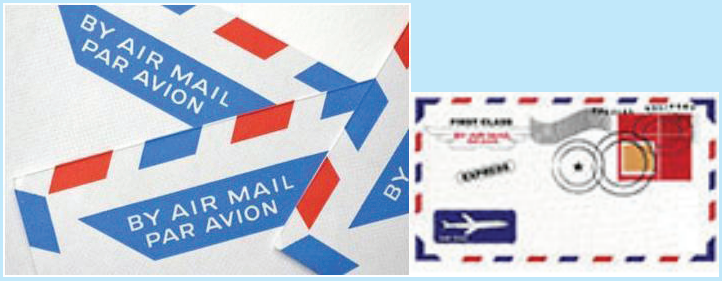
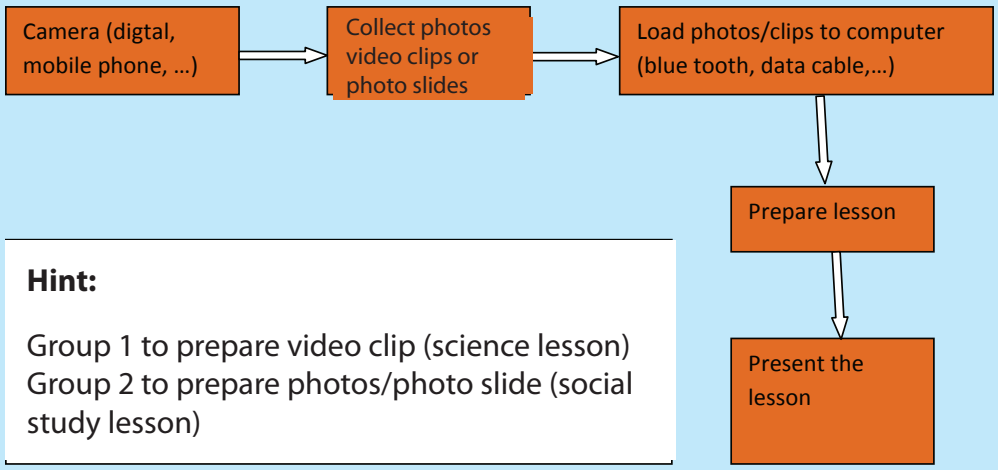


Photo of an envelope and postage stamp

Task 5:

Developing a teaching resource using a camera

Organize the participants into 2 groups develop a teaching resource of their choice (photos, video clip or photo slides) using their creativity, innovativeness and available resources guided by the following scheme.



Hint:

Group 1 to prepare video clip (science lesson)
Group 2 to prepare photos/photo slide (social study lesson)

Sample ICT integrated lesson: The Use of Digital Learning Object(DLO) to Teach a Concept

Primary class 1:

Free manipulation of clay and making of free forms is taught as the sixth topic in creative arts (KIE syllabus vol. 1). Here children are encouraged to mold clay objects and shapes.

A simple video clip can be made and shown to learners as a way of breaking their initial resistance to dirtify their hands.

Lesson Plan

Clay Modeling

1. **Topic**: Formation of free shapes
2. **Aim**: To develop artistic skill in clay molding
3. **Requirements**: Water, clay, container or board to mould the clay, various clay products
4. **Background to the lesson**: Learners understand how to mold clay

	Teacher's Activities	Time	Learner's activities
Introduction	Question What do we use clay for? Let them present the examples for various uses.	3min	Expected answer: Make dolls, cups, jikos, toys.
Development	Show them the **video clip** and pause at: • Give children materials to start preparing clay • Assist children in making the correct mixture • Allow children to play with clay by forming shapes and objects of their choice.	1 min	Let children explain their shapes Let children share
Conclusion	The teacher shows video clip various finished products made of clay	3min	Note the conclusion.

Summary task

Present to the participant the DLO in the link (cleaning hands)

Organise the participants in task groups and instruct them to:

- prepare a lesson based on the DLO as a teaching learning resource.
- present (teach) a lesson about cleaning hands using the DLO resource.

Sub Module 3: Instructional Practice

Introduction

Instructional practice refers to specific teaching methods used by teachers to guide learners achieve learning objectives for a particular lesson or topic. The choice of a particular practice is informed by the teacher's educational orientation or pedagogical training. Modern learning theories emphasise the use of **learner-centered approaches** to teaching where learners are actively engaged. 21st century learning calls for the inculcation of knowledge creation and problem solving skills instead of the presentation of solutions to complex problems.

Specific Objectives

By the end of the sub module, the course participant should be able to:

a. Plan and organise for a 21st century classroom environment
b. Prepare and facilitate a learner-centred ICT integrated lesson
c. Manage a 21st century classroom environment

Planning and organising a 21st century classroom environment

A 21st century teacher is "…highly connected teacher, with ready access to not only the digital content, tools and resources, but also to the experts and peers who can offer immediate assistance regardless of geographical proximity" (Tackett, 2011). This is because the 21st century classroom is a technology enabled environment where learners continuously engage their teachers and peers, challenging the existing knowledge as they seek alternative approaches to new and old challenges.

Task 1

In small groups, discuss and identify the key features that distinguish between the traditional class room and the 21st century class room.

Let the groups use this format to present their findings:

Traditional class room	21st century class room

Hints:

Characteristics of traditional classroom	Characteristics of 21st Century classroom
Pupils seated attentively listening as the teacher gives instructions	Teachers and pupils working together on a classroom project
Time-based	Outcome-based
Focus: memorisation of discrete facts	Focus: what learners know, can do and are like after all the details are forgotten.
Lessons focus on the lower level of Bloom's Taxonomy – knowledge, comprehension and application.	Learning is designed on upper levels of Blooms' – taxonomy, synthesis, analysis and evaluation (and also include lower levels as curriculum is designed from down to top.)
Textbook driven	Research driven
Passive learning	Active Learning
Learners work in isolation – classroom within 4 walls	Learners work collaboratively with classmates and others around the world – the Global Classroom
Teacher-centered: teacher is center of attention and provider of information	Student-centered: teacher is facilitator/coach
Little to no student freedom	Great deal of student freedom
"Discipline problems" – educators do not trust learners and vice versa. No student motivation.	No "discipline problems" – learners and teachers have mutually respectful relationship as co-learners; learners are highly motivated.
Fragmented curriculum	Integrated and Interdisciplinary curriculum
Grades averaged	Grades based on what was learned
Low expectations	High expectations – "If it isn't good it isn't done." We expect, and ensure, that all learners succeed in learning at high levels. Some may go higher – we get out of their way to let them do that.
Teacher is judge. No one else sees student work.	Self, peer and other assessments. Public audience, authentic assessments.
Curriculum or school is irrelevant and meaningless to the learners.	Curriculum is connected to learners' interests, experiences, talents and the real world.

Print is the primary vehicle of learning and assessment.	Performances, projects and multiple forms of media are used for learning and assessment
Diversity in learners is ignored.	Curriculum and instruction address student diversity
Literacy is the 3 R's – reading, writing and arithmetic	Multiple literacies of the 21st century – aligned to living and working in a globalised new millennium.
Factory model, based upon the needs of employers for the Industrial Age of the 19th century. Scientific management.	Global model, based upon the needs of a globalised, high-tech society.
Driven by mean grade and performance in national schools.	Standardised testing has its place. Education is not driven by the KNEC and standardised testing mania.

Learner centered ICT integrated lesson

Teachers need to be aware and prepare for what the learners will experience in the classroom. Planning is usually the first stage for any successful lesson. This is followed by the actual teaching. A self evaluation is then necessary to inform the teacher on which areas to improve in the same or similar lessons. It is a reflective approach to teaching in that it encourages the teacher to reflect on his performance with a view to improving. Some of its key features are that it is learner-centred, activity based and encourages experimentation and improvisation through use of locally available materials.

Example

The following grid may help you in preparing an ICT integrated lesson to teach parts of a flower.

Content (What to Teach)	**Expected outcome (Which 21st century skill?)**	**Lesson Objective**	**Technology (What technology? ICT Hardware, Software)**	**Pedagogy Instructional strategy to use (How to teach?)**
Parts of a flower	Critical thinking, Collaboration	By the end of the lesson learners should be able to • Identify parts of a flower • Draw parts of a flower	Digital camera, LCD projector	Allow learners to take close-up pictures of different flowers. Let learners identify the various parts of a flower and compare with peers.

Task 2

Organise the participants into groups on the basis of their teaching subjects and let them do the following:

a) prepare an ICT integrated lesson
b) present the lesson to the whole group during the plenary

Management of ICT classroom environment

The management of an ICT classroom environment may present new challenges especially if new ICT tools are being introduced. Learners are naturally curious and may expose themselves or peers to dangers like electrocution if not carefully monitored. It is advisable to have an assistant or colleague with you in class to help in class control. This means that an ICT integrated lesson lends itself to *team teaching*.

Just like in science laboratories, it is important that there are safety precautions to be observed while in the ICT classroom.

Task 3

Divide the course participants into small groups.
Each group to discuss how to effectively manage a 21st century classroom.
The groups to share their findings.

Summary

This sub module has highlighted the differences between the traditional class room and the 21st century one. It has indicated that the 21st century learner is also different. This has been brought about by technological change. The implication of this is that the modern teacher has to adjust by embracing change and accepting the application of ICTs in the teaching learning process. Unique challenges brought about by ICTs also compel the teacher to find innovative ways of managing the ICT classroom.

Sub Module 4: Content Knowledge and Curriculum Support

Introduction

Teachers in the 21st century are faced with new and increasingly complex challenges especially due to knowledge explosion. New entertainment, information and communication tools are available at home and learners tend to use them better than their parents and teachers. If meaningfully employed, these tools can enhance teaching and learning. Teachers are therefore encouraged to learn how to use the available technologies and utilise them in their teaching. The use of these ICT tools for teaching and learning is referred to as ICT integration in teaching and learning. In this sub module we will learn how technology can be integrated in the teaching learning process.

Specific Objectives

By the end of the sub-module unit, the course participant should be able to;

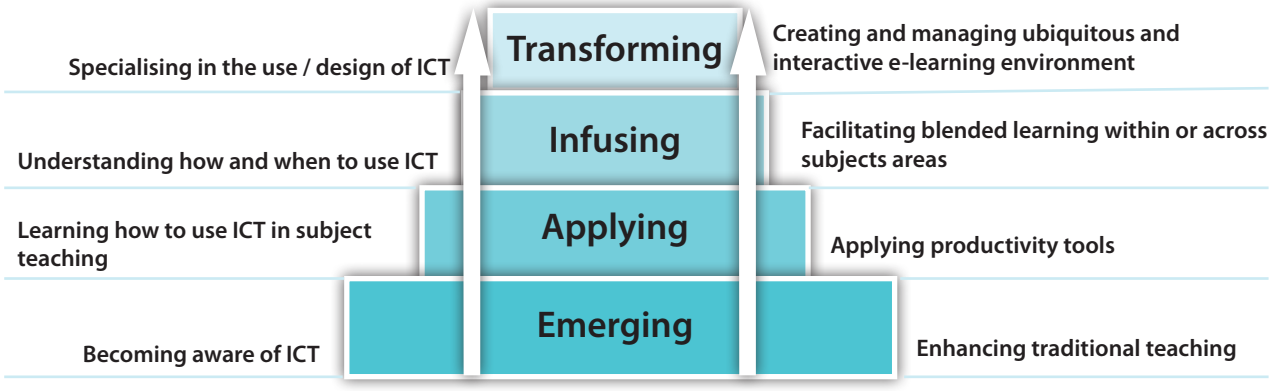
- Integrate technology in the teaching/ learning process.

Task 1

1. What ICTs are available in your school for use in the classroom?
2. Which of these ICTs can you competently use to teach in the classroom?

Get a few responses from the course participant

UNESCO identifies four levels of ICT-Pedagogy integration for teaching and learning in the classroom. These levels are based on the teachers' ICT competency and infrastructure in the schools.



(a) Stages of ICT usage

(b) Pedagogical usages of ICT

Stages of Teachers development in ICT pedagogy

Source: UNESCO Bangkok

Planning an ICT integrated lesson plan.

To plan an ICT integrated lesson, a teacher should consider the entry behavior/level of the learners, the topic to be taught, the appropriate ICTs to teach the topic and how the learners are going to be involved in the lesson. Time for evaluating the prerequisite knowledge of the learners and the learning outcomes should be included in the plan

Task 2

Developing an ICT enhanced lesson plan.

The facilitator leads the Course participants in identify an ICT resource that they can use to develop a lesson plan. For example. Classifying animals. (Tafakari content)

The participants develop a lesson plan using the resource identified and present in plenary.

Sample ICT integrated lesson plan

1. **Topic**: Classifying animals
2. **Objective**: To identify vertebrates and invertebrates
3. **Requirements**: Digital interactive content, LCD projector and laptop
4. **Before this lesson**: Learners should know that animals are classified into vertebrates and invertebrates

	Teaching Activities	Time	Learning activities
Introduction	Question Name some animals found in our environment.	5min	Expected answer: Cow, cat, dog, bird, fish, mosquito, fly etc .
Development	Open the interactive lesson and let learners follow the instructions. Let the learners interact with interactive lesson. Allow learners to explain to each other and the class why some animal belongs to either invertebrates or vertebrates Allow learners to give more animals not in the interactive lesson and classify them into vertebrates and invertebrates	20 min	Learners sharing their ideas learners share their findings

Conclusion	The teacher consolidates the lesson.	5min	Note the conclusion.

Interactive digital content can either be developed by the teacher in the classroom using presentation software like PowerPoint or flash or sourced from repositories in the World Wide Web. Examples include:

1. Via Africa: http://www.classworksacademy.net/media/view/481. (An interactive game about classification of animals which is both fun and educative to the learners.)
2. http://phet.colorado.edu (has many free downloadable simulations and animations for teaching science and mathematics.)
3. Other examples include: www.youtube.com, teachers'TV (www.prometheanplanet.com) and teachers tube, that is www.teachertube.com.

Task 3

Identifying relevant ICT resources and developing an integrated ICT lesson

1. Make a suitable lesson plan to teach classification of animals using the Via Africa resource available at: http://www.classworksacademy.net/media/view/481 or any other relevant resource.
2. Look for any other suitable digital learning material in your subject and use it to develop a teaching/learning concept.
3. Identify one course participant to facilitate a lesson on the teaching learning concept.
4. Let the course participants critic the lesson and identify best practices in delivering an ICT integrated lesson

Summary

It is advisable to have a repository of interactive digital content, simulations and animations which should be saved in a folder for retrieval whenever you need them.

In order to produce digital content, one requires multimedia programming skills. Alternatively, photos and clips can be developed using still and cine cameras. Afterwards, movie editing software such as MS Movie Maker or Blender can be used to edit. The edited clips can then be utilised in teaching and learning.

Sub Module 5: Continuous Lifelong Learning

Introduction

This sub module will define the concept of lifelong learning and the role of ICT in promoting lifelong learning. It will also consider best practices in developing lifelong learning. Towards the end, the concept of problem-based learning is discussed and the process involved. There will also be a take away project to be undertaken by the course participants.

Specific Objectives

By the end of the sub module unit the course participant should be able to:

a. Outline the role of ICTs in lifelong learning
b. State strategies that enhance integration of ICTs in lifelong learning.
c. Develop projects that enhance lifelong learning using ICTs.

Task 1

Assign participants different groups and guide them in discussing the following questions:

- What is "lifelong learning"?
- Why is lifelong learning important?
- Which practices promote lifelong learning?

Each group to present to the others in plenary

Life Long Learning

Life long learning is learning that takes place throughout the life of an individual. It is available at different places and times and cuts across many sectors. It goes beyond traditional schooling and extends into adult life.

Delor's four pillars of education

Learning to know	mastering learning tools rather than acquisition of structured knowledge.
Learning to do	equipping people for the types of work needed now and in the future including innovation and adaptation of learning to future work environments.
Learning to live together, and with others	peacefully resolving conflict, discovering other people and their cultures, fostering community capability, individual competence and capacity, economic resilience, and social inclusion.
Learning to be	education contributes to a person's complete development: mind and body, intelligence, sensitivity.

Lifelong learning can instill creativity, initiative and responsiveness in people thereby enabling them to show adaptability in post-industrial society through enhancing skills to:

- manage uncertainty,
- communicate across and within cultures, sub-cultures, families and communities,
- negotiate conflicts.

The emphasis is on learning to learn and the ability to keep learning for a lifetime. It is widely accepted that as knowledge and skills become obsolete, individuals continuously update their competencies in a process of continuous learning.

Role of ICTs in lifelong learning

The world is changing and the need for lifelong learning is necessary in order for people and countries to stay abreast with changes and remain competitive. ICT has an obvious potential to improve access to and quality of lifelong learning.

Task 2

Lead the participants to discuss in small groups ways in which ICTs can promote lifelong learning. The groups to report to the plenary

ICTs have the potential to play the following roles in lifelong learning.

1) *Enhancing learning*

ICT can be used as a tool for acquisition of literacy skills. For example, the radio can make literacy lessons more interesting if used in combination with printed course material. The TV combines both audio and visual stimuli to enhance information processing and memory retention.

2) *Broadening access to literacy education*

ICTs are seen as robust tools to reach the unreached and promote universal access to quality learning in a country. This is particularly so for scattered populations in vast territories with nomadic traditions such as the ASAL areas in Kenya.

3) *Creating local content*

ICTs can enable the rapid and cost-effective creation and distribution of socially, culturally and linguistically appropriate learning content. For example, word processing software can be used to modify literacy education material that has been developed elsewhere to make it available in local languages and on locally relevant subjects.

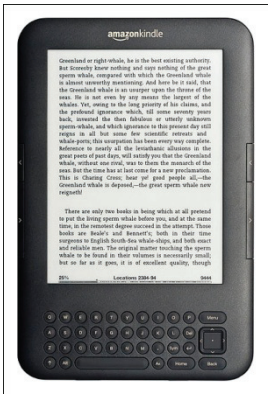
4) *Professional development of teachers*

Qualified and trained teachers are the key to quality teaching and learner motivation.

However, in many countries professional expertise is limited and thinly distributed particularly for the provision of non-formal literacy education. While ICTs cannot be a substitute for teachers, ICTs can supplement and support teachers by reducing their workload and enhancing their lessons. ICTs can also be used to enhance teachers' professional development e.g. the *Elimika* Primary Teacher Orientation course by KICD.

5) *Cultivating a literacy conducive environment*

For literacy to become widespread in a society, written material should also be readily available in daily life and accessible to all. Such environment cultivates opportunities for coming into contact with, and creating, written material and thereby reinforces and promotes the development of literacy skills. ICTs increase the reading options by for example offering e-books and audio formats of content which one simply listens to.



Strategies for Lifelong Learning through ICTs

Learning gives new knowledge which can be used to improve one's life as well as being a source of enjoyment. Due to the demands of today's busy life, people can only find time to learn what is essential. Anything beyond that is considered frivolous. Even those who do appreciate the value of lifelong learning can find it difficult to make the effort. Cultivating a culture of lifelong learning is therefore a deliberate effort.

Task 3

Organise participants into groups and let them come up with ICT strategies that a government can use to promote lifelong learning among its citizens.

Hint: (come up with at least four strategies)

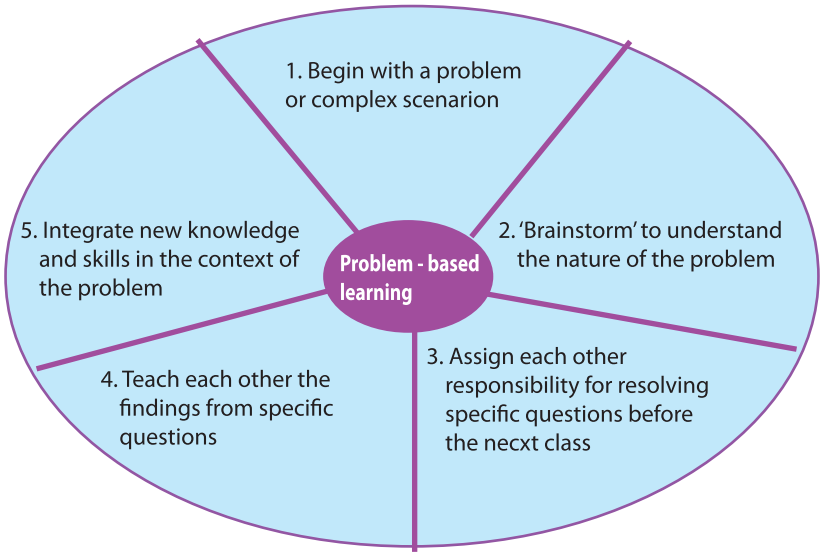
PROBLEM BASED LEARNING

In Project Based Learning (PBL), learners go through an extended process of inquiry in response to a complex question, problem, or challenge. Rigorous projects help learners learn key academic content and practice 21st Century Skills (such as collaboration, communication and critical thinking).

Problem-based learning is the type of classroom organisation needed to support a constructivist approach to teaching and learning. Savoie and Hughes (1994), writing about a process that they used to design a problem based learning experience for their learners, describe the following actions for creating such a process:

1) Identify a problem suitable for the learners.
2) Connect the problem with the context of the learners' world so that it presents authentic opportunities.
3) Organise the subject matter around the problem, not the discipline.
4) Give learners responsibility for defining their learning experience and planning to solve the problem.
5) Encourage collaboration by creating learning teams.
6) Expect all learners to demonstrate the results of their learning through a product or performance.

The diagram below illustrates problem based solving process:



Task 4

Divide the course participants into into small groups and let them come up with a project-based problem for the learners in a subject of their choice e.g. Social studies, Kiswahili, Number work, Science, etc
Let the group leaders present their ideas in a plenary.

Hint:
Let the participants consider;

- open-ended questions
- encouraging the use of ICTs
- allowing as many learners as possible to be involved
- giving precautions
- the support which learners will require
- the task to be at level of the lerners

Summary

This sub-module has defined the concept of lifelong learning and what it entails. It has also discussed the role of ICT in enhancing lifelong learning. Best practices for promoting lifelong learning have been highlighted. It has also explained problem based learning with an illustration to enhance understanding. A project for the course participants concludes the topic.

Sub-Module 6: Introduction to the 21st Century Skills

Introduction

We now live in an increasingly diverse, globalized, and complex, media-saturated society. Technically it is the 21st century, but schools are yet to get to the 21st century. Our challenge is to reinvent the school for the 21st century, for the sake of our children, the learners and the welfare of our world. This calls for a paradigm shift to 21st century education.

Specific objective

- Identify the 21st century skills at the workplace, homes and families, schools, communities and citizens in the global village

What are 21st century skills?

The term "21st-century skills" is generally used to refer to certain core competencies that schools need to teach to help learners thrive in today's world.

Task 1

Divide the course participants into small groups and let them discuss the following scenario.

The Kenya National Examination Council requires examination candidates to be registered online for all examinations. The head teacher of your school has asked you to handle this matter.

Using word, draw a table like the one below and fill in the details.

Possible Challenges	New skills required for the task	How you will acquire the required knowledge and skills

Let the participants share their points in plenary.

Task 2

Guiding question: Let us now think about our learners; do they have adequate skills to survive in modern society?

Divide the course participants into small groups and allow them to discuss:

a) The major challenges facing young people today as a result of technological and social changes in the society.

b) Using word, draw a table similar to the one below and fill in the required information. Explain how the young people are coping with each of the challenges you have identified.

c) Do you think the school is equipping the young people with the necessary skills?

Challenges facing young people today	How are the young people dealing with the challenges?	Skills learnt in schools used for dealing with the challenges

From the foregoing, it is evident that the 21st century requires new skills to help learners cope with societal changes.

In this regard, 21st century skills refer to basic competencies which will enable both the young and the old cope with the demands of modern life.

The 21st skills are displayed in the table below.

Accountability and adaptability	We are expected to exercise personal responsibility and flexibility both at work and in our personal lives. It also involves setting and meeting high standards and being tolerant.
Communication skills	Every day we are expected to create and manage effectively oral, written and multimedia communication.
Creativity and intellectual curiosity	We expect learners not only to be consumers of information but to also come up generate new ideas. This can only be done if they are open and responsive to new and diverse perspectives.

Critical thinking	People are increasingly required to exercise sound reasoning in order to understand and make complex choices and to understand the interrelationships that exist in the world
Information and media literacy skills	With increased information in the world, one is expected to analyze, analyzing, access, manage, integrate, evaluate and create information in a variety of forms and media.
Interpersonal and collaborative skills	Demonstrating teamwork and leadership; adapting to varied roles and responsibilities, working productively with others; exercising empathy; respecting diverse perspectives
Problem identification, formulation and solutions	Ability to frame, analyse and solve problems.
Self-direction	Monitoring one's own understanding and learning needs; locating appropriate resources; transferring learning from one domain to the another.
Social responsibility	Acting responsibly with the interest of the larger community in mind; demonstrating ethical behavior in personal, workplace and community contexts.

Task 3

Let the course participants divide themselves into small groups for the following task.

Identify topics in various subjects of the school curriculum that can help learners acquire some of the 21st century skills identified above.

Allow the groups to share with each other the outcomes of their discussion.

Skills of the 21st century at the work place

For employees to effectively perform their jobs in the workplace, they need to:

- Analyse, transform and create information
- Collaborate with workers to solve problems and make decisions
- Perform a variety of complex tasks using sophisticated technology

21st century skills for homes and families

The following are 21st century skills that are required in our homes.

- Entertainment by watching, creating and participating in a variety of media
- Make consumer decisions by looking for information from the internet
- Stay in touch with friends and family members through various technologies.

21st century communities and citizens

Task 4

Let the course participants individually reflect upon the mobile phone services and answer the following:

a) List down the services offered through the mobile phone.

b) List down government services that can be accessed either through the mobile phone or through the internet.

c) Explain the skills that one requires to effectively use the mobile phone services.

Hint:

- use of the internet to stay informed about local, national and global issues
- communicating and persuading others about their opinions using different technologies
- complying with government regulations without leaving their homes

21st century schools and learners

Learners of the 21st century require new skills to cope with learning and fit in the society. The knowledge age requires that learners acquire the following skills:

- work on complex, challenging tasks that require them to think deeply about subject matter and manage their own learning
- collaborate with peers, teachers and experts on meaningful tasks using higher- order thinking
- use technology to make decisions, solve problems and create new ideas.

Task5

Lead the course participants into small groups and brainstorm on the following

i) Identify concepts that you learnt in school

ii) Explain how you are still using the concept either in your work life, home or community today.

iii) List down some new skills that you are now required to learn in order to cope with the demands of modern life.

Course participants to open a new word document and create a table like the one below. Complete the table and save your document. Present your findings to the plenary.

Concepts that I learnt in school	How I am using the concept today	New concepts that I need to learn in order to cope with modern life

Summary

The sub module has brought out what is meant by 21st century skills. It has highlighted the key skills that will be needed for survival, relevance and functionality in the 21st century. It has given practical sessions meant to develop the skills at the workplace, community and schools.

Sub-Module 7: Collaboration

Introduction

In recent years, the importance of collaboration in classrooms has grown for two principal reasons: workplaces have changed requiring more team work and collaborative practice; and learning is more effective when learners can share processes, ideas and knowledge building. It is the interaction between learners and between teachers aiming to develop new understanding that is at the heart of collaborative practice. Collaboration emphasises activities where each participant comes with new knowledge and understanding due to interactions with others. Sharing, contributing to, reflecting on and listening are all important parts of this process, with the outcome being a shared development of understanding. To prepare learners for 21st century requires a paradigm shift in the teaching and learning process. In this module we will develop collaborative skills.

Specific objectives:

By the end of the sub module unit, you should be able to:

a. Describe the different aspects of collaboration
b. Identify collaboration skills in the workplace, homes and families, schools, communities, citizens and the global village.

Definition of collaboration

Collaboration can be defined as working jointly with others or together especially in an intellectual endeavor. It involves demonstrating teamwork and leadership; adapting to varied roles and responsibilities and working productively with others.

Task 1

Organize the course participants into small groups and then assign one of these tasks to discuss.

How would you provide solutions to:
i) When a learner refuses to work with a partner or in a group
ii) When other learners do not want to work with a specific learner
iv) When one learner does not let a partner or other group members to share the laptop
Let the course participants share their solutions with the others in plenary.

Aspects of collaboration

In an education situation, collaborative learning involves activities such as:

- Collaborative writing
- Group projects
- Joint problem solving,

- Class debates,
- Study teams

Collaboration skills at the workplace

Task 2

Identifying collaborative activities

The facilitator guides the course participants in developing collaborative skills given the following scenario.

Your school is planning a field trip to the Rift valley for class 7 and 8 pupils. Create a table in the word processor of your computer. Type the information in the table below and type in the appropriate responses in the spaces to the right. Prepare a class presentation to be displayed.to the whole group during plenary.

Topics that can be enhanced by the educational visit	
List down categories of people who may be involved in the trip	
How can ICTs help in the planning for a successful trip. Mobile phones: The internet Google map Digital camera	

Developing collaborative skills

From the above activity, you may have realized that planning an educational trip, is made easier when other people are involved. For example, other teachers whose subjects will benefit from the trip can help in planning for the trip. The learners themselves may also be involved in planning for some of the activities. When learners and teachers come together to perform a task in order to achieve an objective, we refer to the activity as collaborative learning. In such situations, the teachers play a facilitative role while the learners learn from each other.

Research has shown that collaboration provides opportunities for learners to improve academic performance in that they ask questions, discuss ideas, explore solutions, clarify their own thinking and develop deeper understanding of the content.

Collaborative learning also leads to the acquisition of social skills such such as turn taking, sharing, giving help to others, and accepting help from others.

Teachers need to work together in order to facilitate learning. When using ICTs, teachers can collaborate when doing the following:

- Developing a school ICT policy
- Forming Teacher Design Teams to help in the development of ICT integrated lesson plans
- Drawing up a timetable for ICT integration
- Use of the ICT resources available in the school.

Task 4

Divide the course participants into small groups and then assign them the following tasks.

a. Identify three topics that you normally teach where collaboration might be useful.

b. Develop a learning activity that requires learners to work collaboratively to solve it.

Let the course participants present their findings in plenary.

Summary

In this module we have discussed how we can enhance collaboration. Some of the teaching techniques that foster collaboration are;

- Providing frameworks to support group investigation and enquiry
- Setting group rules for collaborative practices
- Being conscious of group sizes for each activity
- Supporting the groups in the mechanisms of group work and collaboration
- Supporting questioning and reflection and asking open questions.
- Reviewing individual input and roles within collaborative activities

(Adapted from Microsoft Partners in Learning)

Sub Module 8: Problem Solving

Introduction

For learners to acquire problem solving skills, they should be presented with learning situations which involve real life problems so that as they go through the process of solving the problem, they acquire the knowledge and competencies that they can utilise when faced with similar problems in future.

Learners are more likely to learn that which seems to help them solve problems in their immediate environment as opposed to the acquisition of facts and ideas that they are not able to relate to.

Specific Objectives

By the end of this module sub unit, the course participant should be able to:

a. Define problem solving
b. Describe different aspects of problem solving
c. Identify problem solving skills in the workplace, homes and families, schools, communities, citizens and global village.

i. Definition of problem solving

Problem solving refers to generating and testing creative ideas in order to solve a problem. It involves learning from real world situations in order to come up with solutions to problems.

ii. Aspects of problem solving

a) Uses of real world problems - problems are relevant and contextual. It is in the process of struggling with actual problems that learners master content and critical thinking skills.
b) Reliance on problems to drive the curriculum - the problems do not test skills; they assist in development of the skills themselves.
c) The problems are open-ended and there are not meant to be one solution, and as new information is gathered in an interactive process, perception of the problem, and thus the solution, changes.

Problem solving involves both the process and product of a learning activity. As the learners go through the process of solving a problem, they acquire more knowledge which helps them come up with solutions to the problem they are trying to address. The table below illustrates the knowledge that is acquired for the steps in the process of problem solving.

Process	Purpose
The learners are presented with a problem without background information.	Teaches learners to encode and organise information in useful ways. Allows learners to find what they know and what they do not know. Misconceptions can be corrected in discussion of the problem. Mimics the real life situations context they will face in future as teachers, doctors, farmers etc.
Learners use previously acquired knowledge and skills to discuss and analyse the problem. Teacher poses questions: i.e. Do you need more information? • Are you sure of the facts or will a review be helpful? • Do you think more information on this area would be helpful? • Teachers encourage hypotheses grounded in facts.	Helps in the development of cognitive skills for problem-solving process Development of self-monitoring skills to identify the learning needs Development of habitual learner- initiated questioning
Learners decide what they need to know and where they might best find the information. They decide which resources to use (people, published papers, etc.).	Self-directed study
Learners revisit problem with new information and knowledge acquired during self-study. Learners critique learning resources used. Group decides appropriate hypotheses and critiques prior performance.	New organisation of information to problem-solve. Self-assessment Peer-assessment
Learners should think about how what they learned has added value to their understanding	Reflection Self-assessment

iii. (a) Problem solving skills at the workplace

Effective problem solving skills enable employees to analyse problems, identify problem severity and assess the impact of alternative solutions. Problem solving skills help employees to work more efficiently with co-workers, customers, partners and stakeholders. The staff is able to use available resources to resolve issues in a constructive manner.

Additionally, they practise consensus building by seeing a problem from a professional, not personal,

perspective.

Some of the key problem-solving skills employers are seeking include the following:

- Identifying and implementing measures to increase productivity, improve efficiency, develop a new product or enhance customer service
- Settling issues through effective conflict resolution
- Demonstrating initiative and resourcefulness to head off issues before they become problems
- Unwillingness to accept "I don't know" as a valid response to a question
- Flexibility and mental agility to quickly shift priorities and adapt to change

Below is an example of a problem requiring the application of problem solving skills that participants may encounter at school.

Task 1

- Divide the course participants into small groups.
- Ask the groups to read and do the task in the caption below and fill the gaps.
- Participants should take about 20 minutes.
- Each group leader to present the completed task to the rest of the participants.

Problem situation: Anita is a class 2 pupil in your school and has three other siblings in the school. She comes late to school everyday and her class teacher has noted that Anita's health is deteriorating and that she sleeps a lot during lessons. Since you are concerned about this, you summon Anita's mother to school and she confides that they belong to a cultic fellowship whose members do not seek medical attention. They believe in the power of prayer. As a concerned teacher, you want to help Anita so that she can learn like the other children and also enjoy her childhood.
Process
Step 1: Identify the problem (try to define what the problem is)
Step 2: What do you know about the problem? (list down what you know about the problem)

Step 3: What issues do you think need to be considered in solving the problem? Issue 1 Issue 2 Issue 3
Step 4: Searching the internet Look for information on how you can solve the problem on the internet. (list the website and the information that you have visited) Site: Information: Site: Information: Site: Information:
Step 4: Conclusion
Step 5: Recommendations

(b) Problem solving skills in school

Problem solving is one of the basic 21st century skills which every student should be able to develop. By implication, problem solving inherently involves decision-making, another essential skill both for the learner's academic achievement as well as success in life.

Teaching learners how to solve problems has the following benefits:

- Using effective problem solving techniques will help learners avoid conflicts in a school setting and in their day to day lives
- It can also strengthen learners' empathy skills
- It can help learners to gauge other peoples' intentions more favourably
- Problem solving is essential for school readiness and academic success.

Task 2

Divide the course participants into small groups according to their teaching subjects.

Each group should identify a concept that can be taught through problem based learning. The group will also come up with a hypothetical problem, develop a template and do the following:

a) identify the problem

b) list the possible solutions or courses of action

c) weigh the possible solutions

d) choose a solution to try.

NB: Bring to the attention of the participants the fact that the class level of the learners should determine the number of steps in the PBL process. In addition, the complexity of the problem should also be based on the level of learners.

Summary

The 21st century requires people who can actively solve the problems they face. Problem solving skills are required both at school and in the work places. The instructional methods used in school should be based on real life problems that will give learners the opportunity to come up with innovative ways of resolving them.

Sub Module 9: Communication

Introduction

Technology has revolutionised communication in the 21st century. Newer and faster modes of communication have been developed. These modes are faster, more effective and able to reach more people. The need for effective communication is no longer confined to language classes. Learners in all areas of academic study, and in future careers must be able to communicate clearly and persuasively on a variety of subjects. All learners ought to communicate their own ideas regarding a concept or an issue effectively. Such communication should be supported with evidence and designed with a particular audience in mind.

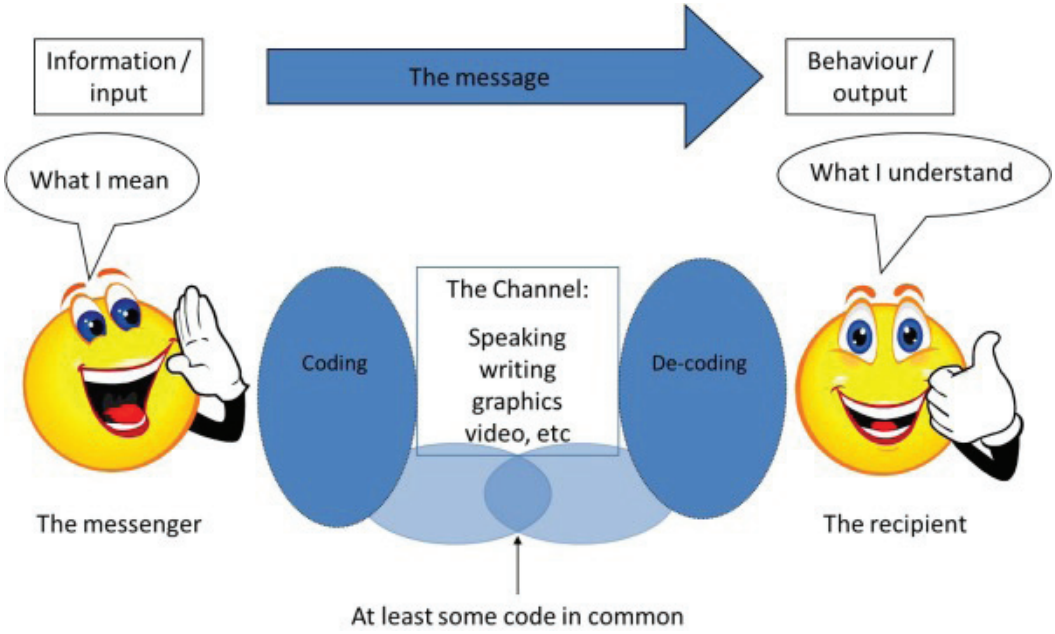
Specific objectives

By the end of the sub-module unit, the course participants should be able to:

a. Define effective communication
b. Aspects of effective communication
c. Effective communication skills at the workplace, homes and families, schools, communities, citizens and the global village.

Definition of Effective communication

Effective communication is a two-way information sharing process which involves one party sending a message that is easily understood by the receiving party. Effective communication is the process through which a message is passed to the intended recipient and it is understood by him/her, thus eliciting the required response. Below is an illustration of the elements in the communication process:



Source: http://pgdwc.blogspot.com/2012/08/elements-of-communication.html

i. Aspects of Effective communication

a) Extended communication

involves presentation of connected ideas rather than a single simple thought. In written communication, ideas are presented in well explained paragraphs rather than in sentences or phrases

b) Bi-modal communication

involves the use of more than one type of communication mode or tool in order to communicate

c) Supportive evidence

requires evidence of one's reasoning or provision of supporting facts or examples. The evidence should be sufficient to support the claim that the person is making.

ii. Effective communication at school

In learning situations, we expect learner's communication to be extended, bimodal and supportive. Extended communication requires learners to produce communication that represents a set of connected ideas, not a single simple thought. In written work, we would expect learners to write one or more complete paragraphs rather than a sentence or phrase.

Learners may use ICT to make a presentation using video, podcast or a page that illustrates several ideas. Effective communication in learning situations does not focus on informal classroom talk, whether face-to-face or electronic. Rather, it focuses on activities that require learners to articulate their ideas in a permanent form e.g. a presentation, a podcast, a written document or an email. As much as informal conversations may also be very important aspects of communication, but the effective use of media can only be measured in terms of the outcome related to the learning goals of the activity.

Let us now look at the examples given below to illustrate learning activities that would be considered as extended communication:

Does the Learning Activity involve Extended Communication	
Yes	**No**
Learners host a video conference where they present on different topics about their city to peers in their sister-city and then answer follow- up questions.	Learners participate in a video conference where they listen to presentations by peers from their sister city and then ask follow up questions.
Learners write an extended proof to demonstrate the solution to a geometry problem.	Learners solve a geometry problem, but do not write any proof

Learners write a letter to the editor in response to a recent news article of their choice.	Learners post a one sentence comment in response to a recent news article of their choice.
Learners hold a Skype conversation with peers from another school to create a plan for the performance they will put on together about the novel they read.	Learners hold a Skype conversation with peers from another school to talk about the novel they read.

In effective communication, learners are required to design their communication for a particular audience where they must ensure that their communication is appropriate to the specific readers, listeners, viewers, or others with whom they are communicating. It is not sufficient for learners to be communicating to a general audience on the internet. They must have in mind a specific group with specific needs in order to shape their communication appropriately.

When they are communicating with a particular audience, learners must select the tools, content, or style that they use to reach the audience. They might be required to consider what tools the audience has access to or uses on a regular basis, the relevant information they must present in order for the audience to understand their message or the formality or informality of the language they choose in order to be appropriate to the audience.

A teacher may design a learning activity for a particular audience or allow learners to select their own audience. However, it is not mandatory that the audience sees the communication even though it is highly recommended. The requirement is that the learners must develop their communication with that audience in mind. For example, learners might develop some type of presentation to teach younger learners how to divide fractions. They will have to decide what medium to use in order to reach those learners (for example, a podcast), and what type of language and content the learners would understand and relate to. This satisfies the requirement even if the podcast is never used by younger learners.

Task 1

Divide the participants into groups of five.

Each group to design a presentation on some basic rules for use of ICT

Participants should ensure that the presentation is extended, bi-modal and supportive.

Below are tools that can be used by teachers to enhance communication in the teaching and learning process:

- Blogs
- Wikis
- Video conferencing
- emails
- Digital cameras
- Digital story telling
- Skype
- Social networks such as face book and twitter

iv) Digital story telling

Digital story telling is the idea of combining the long standing art of telling stories with multimedia tools such as graphics, audio, video animation, and web publishing. Digital story telling:

- enhances effective communication for teachers and is suitable or young children
- provides a new way to tell stories
- boosts children's ability and enables them to generate interpretive movies.

Digital story telling consists of the following components:

- media
- action
- relationship
- context
- communication

Digital story telling differs from traditional story telling sessions in the sense that it contains:computer-based images, text, recorded audio narration, video clips, and/or music.

Sub Module 10: Creativity and Innovation

Introduction

This sub module will discuss and explain the concept of creativity and innovation. It will also bring out a distinction between the two concepts of creativity and innovation. The different aspects of creativity and innovation will be outlined and explained. There is also a brief explanation on sources of creativity and innovation. The sub module concludes with the identification of creativity and innovation at the workplace, homes and families, communities, citizens and global village and schools.

Specific Objectives

By the end of the sub module, the course participant should be able to:

a. Define creativity and innovation
b. Describe the different aspects of creativity and innovation
c. Identify creativity and innovation skills in the workplace, homes and families, communities, citizens and global village, and schools

Task 1

Plenary disussion

Have a question and answer session whereby you can ask the following:

a) what is creativity and innovation?

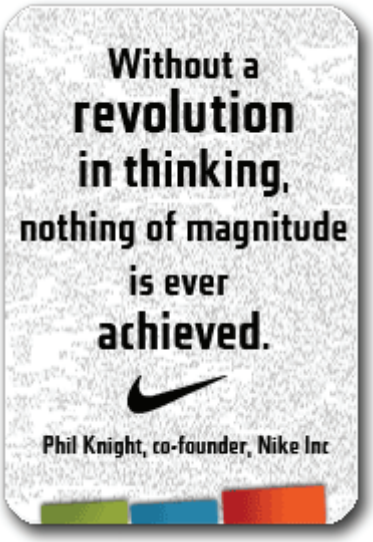
b) distinguish between creativity and innovation.

c) give examples of works of creativity and innovation.

Definition of creativity and innovation

Webster's dictionary defines innovation as the introduction of something new and making changes. Innovation is taking a working product or process and adding something new to it. When a change is made to a process to make it work better or fulfills a different need it is innovating on what already exists. Creativity is the generation of new ideas while innovation involves the implementation of ideas generated through creativity. The two terms can be used interchangeably and originate from within an individual. This means they are based on intuition. The distinction between creativity and innovation in a nutshell is as follows:"Creativity is the capability or act of conceiving something original or unusual." while "Innovation is the implementation of something new."

Meaning of creativity and innovation.



An idea is the starting point of creativity and innovation. Without ideas there can never be anything creative or innovative. Just like without cells there can be no living things. Ideas are the building blocks of creativity and innovation. While creativity is a thinking process, innovation is a productive process. Innovation adds value to the idea, which otherwise remains a mere idea. If the idea is likened to a seed, then innovation is the plant that results from planting and nurturing the seed.

Aspects of creativity

Some people are more creative than others and scholars attribute that phenomenon to the four Ps, namely, process, product, person and place. Creative persons are more flexible and do not conform to the prevailing conditions in a given environment. In the Walla's stage model, creative insights and illuminations may be explained by a process consisting of 5 stages:

(i) *preparation* (preparatory work on a problem that focuses the individual's mind on the problem and explores the problem's dimensions),
(ii) *incubation* (where the problem is internalised into the unconscious mind and nothing appears externally to be happening),
(iii) *intimation* (the creative person gets a "feeling" that a solution is on its way),
(iv) *illumination* or insight (where the creative idea bursts forth from its preconscious processing into conscious awareness); and
(v) *verification* (where the idea is consciously verified, elaborated, and then applied).
NB:Wallas' model is often treated as four stages, with "intimation" seen as a sub stage.

Task 2

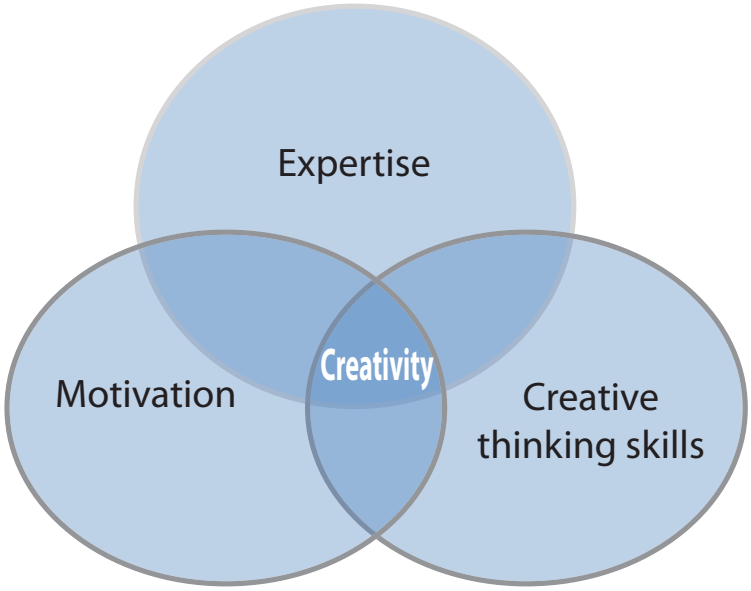
Discussion groups

Organise the course participants into small groups and let them discuss the following:
a) Suggest ways in which your school can nurture creativity and innovation among learners.
b) How can each of the following promote creativity and innovation?

- Homes and families
- In communities
- Citizens and global village

Let the groups report to the plenary

SOURCES OF CREATIVITY AND INNOVATION



From the 3 main components of sources of creativity illustrated in the diagram above, the following are key to individual creativity: expertise, creative thinking skills and personal motivation.

Expertise

This comprises of knowledge-technical, procedural or intellectual in nature. There should be a balance between the breadth and depth of knowledge.

Creative thinking skills.

This involves how flexibly and imaginatively people approach problems. There is a strong ability to generate ideas with a combination of analytic and practical thinking.

Personal motivation.

There should be appropriate levels of intrinsic motivation,passion and self-confidence to enhance creativity.

Environment.

It requires a non threatening and non controlling climate which is conducive for idea generation.

Specific approaches to creativity and innovation

Nickerson provides a summary of the various creativity techniques that have been proposed for inculcating creativity and innovation. These include approaches that have been developed by both the academic world and industry as outlined below:

1. Establishing purpose and intention
2. Building basic skills
3. Encouraging acquisitions of domain specific knowledge

4. Stimulating and rewarding curiosity and exploration
5. Building motivation, especially internal motivation
6. Encouraging confidence and a willingness to take risks
7. Focusing on mastery and self-competition
8. Promoting supportable beliefs about creativity
9. Providing opportunities for choice and discovery
10. Developing self-management (metacognitive skills)
11. Teaching techniques and strategies for facilitating creative performance
12. Providing balance

Task 3

Identify a problem that may hinder ICT integration in your school. Use the steps outlined in the Wallas' model to arrive at a solution to that problem. Present your assignment to the other participants.

Hint: preparation, incubation, intimation, illumination, verification

Summary

This sub module has defined the concepts of creativity and innovation. The distinction between the concepts of creativity and innovation has been highlighted. Various aspects of creativity and innovation have been explained. The sources of creativity and innovation have been briefly outlined. The sub module concludes with a discussion on creative and innovative techniques necessary in various places like school and workplaces.

Sub Module 11: Self Regulation and Initiative

Introduction

It is a process of taking control of and evaluating one's own learning and behavior. It may also refer to guiding behavior along a specific path to a directed aim or goal. Self-regulation also means regulating emotions, motivation, cognition (e.g. attention), social interactions and physical behavior (Karoly, 1993).

Specific Objectives

a. Define self-regulation

b. Describe the different aspects of self-regulation

c. Identify self-regulation skills in the workplace, homes, and families, communities, citizens and global village and schools

What does initiative mean?

It is the ability to decide in an independent way what to do and when to do it or the opportunity to take action before other people do. A person's eagerness to do something voluntarily is also an instance of self regulation.

Task 1:
Divide the course participants into small groups and let them engage in self regulated activity or activities for 10 minutes.

The participants should report during the plenary on what they did.

Three aspects of self-regulation.

Self-regulated learning involves the regulation of 3 general aspects of academic learning as follows:

1. **Self-regulation of behavior**

   This involves the active control of various resources learners have , for example, time, study environment, peers, teachers, etc. Control of behavior helps the learner to stay on track in reaching their learning goal.

2. **Self regulation of motivation and affect**

   This involves controlling and changing motivational beliefs ,for example, self efficacy, goal orientation among others so that learners can adapt to the demands of a course. Learners also learn how to control emotions such as anxiety for the benefit of learning. They require motivation to apply effort and continue even when faced with difficulty.

3. **Self regulation of cognition.**

This involves the control of various cognitive strategies for learning ,for example, self assessement, questioning, critical thinking etc.

SOURCES OF SELF REGULATED LEARNING

There are three sources of self regulated learning, namely,

Active/executive self regulation

This is regulated by the person and is intentional, deliberate, conscious and voluntary. A good example is formal education system.

Dynamic self-regulation

This also refers to unintentional learning. The learner is not consciously aware they are learning. The hidden curriculum and emulation of role models best illustrate this.

Interest creating discovery model

It is also described as "bio-functional" as it is developed from both the active and dynamic models of self regulation. Learning takes place in a creative mode of functioning and is neither completely person driven nor unconscious but a combination of both. Informal education best explains this source.

Task 2

Ask course participants to get into groups and outline self regulated activities learned through the following sources:

a) Active/executive self-regulation.

b) Dynamic self-regulation.

c) Interest-creating discovery model.

APPLICATION OF SELF-REGULATION IN SCHOOLS.

The primary goal for a teacher is to produce self regulated learners. Self regulated learning accelerates the learning process and maintains long term retention rates. There are three main areas of direct application in classrooms:

- Literacy instructions
- Cognitive engagement

- Self assessment

These strategies will also enhance academic success in learners. In the area of literacy instruction, educators teach learners the skills they need to become self regulated by using strategies like reciprocal teaching (peer teaching), open ended tasks, project based learning, authentic assessments and autonomy based assignments. These learning strategies are student centered and inquiry based. They enable learners to be more autonomous and self regulated.

Self regulated learners display the following behaviors:

- Finish homework as per deadlines
- Study with focus
- Concentrate on school subjects
- Have useful class notes
- Active use of the library for information to do assignments
- Effectively plan schoolwork
- Effectively organize schoolwork
- Remember information presented in class and textbooks
- Active class participation
- Effective time management

On the other hand, learners who are not self-regulated learners have the following behaviors:

- Day dreaming
- Rarely complete assignments
- Some forget assignments completely
- Truancy
- Lack of concentration in class
- Do not participate in class
- Poor time management

Task 3

In small groups, brainstorm on various school activities and the self-regulation skills they promote in the learners.

Let the course participants share their school activities in plenary

Hints on examples of self-regulation skills in Learners

- Self awareness
- reading comprehension
- Self monitoring
- Critical thinking
- Flexibility.
- Problem solving skills
- Moral cognition
- Fewer behavior problems
- Social interaction
- High intrinsic motivation
- Self worth/self-esteem
- Perceived competence
- Moral conduct

Summary Task

Discuss in groups at least five self regulation activities and the self regulated skills they develop in:

a) families.

b) citizens.

c) communities.

d) the global village.

Summary

Self-regulation and initiatives are key components of 21st century skills which should be learnt by all learners, teachers and the community at large. This is more so because the knowledge society requires a balanced person who is in touch with the environment and can adapt to changing the challenges it presents and offer solutions to them.

APPENDICES

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ANNEX 2

Training Manual Development Panel

1.	Martin Kungania	-MOEST
2.	John Oyuga	-MOEST
3.	Ann Njagi	-TSC
4.	Mary Mberia	- TSC
5.	Mutua Muyunga	- CEMASTEA
6.	Purity Kibui	- KEMI
7.	Stephen Oduor	- INTEL
8.	John Kimotho	- KICD
9.	Mary Wambaria	- KICD
10.	Esther Gacicio	- KICD
11.	Eunice Gachoka	- KICD
12.	Judith Muriuki	- KICD
13.	Grace Mwiti	- KICD
14.	Lydia Mucheru	- KICD
15.	Kanyi Gioko	- KICD
16.	Lynette Karimi	- KICD
17.	Martin Kagiri	- KICD
18.	Patrick Nyanjui	- KICD
19.	Antony Maina	- KICD
20.	Peris Wachuka	- Graphics Designer – KICD
21.	Martha Maina	- Panel Secretary – KICD
22.	Joyce N. Mwangi	- Panel Secretary KICD