

ICT FOR GENERAL EDUCATION

Senior 4

TEACHER'S BOOK

Experimental version

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FOREWORD

Dear Teacher,

Rwanda Education Board is honored to present Senior Four Teacher's Book which serves as a guide to competence-based teaching and learning to ensure consistency and coherence in the learning of the ICT in general education. The Rwandan educational philosophy is to ensure that student achieve full potential at every level of education which will prepare them to be well integrated in society and exploit employment opportunities.

In line with efforts to improve the quality of education, the government of Rwanda emphasizes the importance of aligning teaching and learning materials with the syllabus to facilitate their learning process. Many factors influence what they learn, how well they learn and the competences they acquire. Those factors include the relevance of the specific content, the quality of the teacher's pedagogical approaches, the assessment strategies and the instructional materials available. Special attention was paid to the activity that facilitate the learning process in which student can develop ideas and make new discoveries during concrete activity carried out individually or with peers. With the help of teachers, student will gain appropriate skills and be able to apply what they have learnt in real life situations. Hence, they will be able to develop certain values and attitudes allowing them to make a difference not only to their own lives but also to the nation.

This is in contrast to traditional learning theories which view learning mainly as a process of acquiring knowledge from the more knowledgeable who is mostly the teacher. In competence-based curriculum, learning is considered as a process of active building and developing of knowledge and understanding, skills, values and attitudes by the learner, where concepts are mainly introduced by an activity, situation or scenario that helps the learner to construct knowledge, develop skills and acquire positive attitudes and values.

In addition, such active learning engages student in doing things and thinking about the things they are doing. They are encouraged to bring their own real experiences and knowledge into the learning processes. In view of this, your role is to:

- Plan your lessons and prepare appropriate teaching materials.
- Organize group discussions for student considering the importance of social constructivism suggesting that learning occurs more effectively when the learner works collaboratively with more knowledgeable and experienced people.
- Engage student through active learning methods such as inquiry methods, group discussions, research, investigative activity and individual work activity.
- Provide supervised opportunities for student to develop different competences by giving tasks which enhance critical thinking, problem solving, research, creativity and innovation, communication and cooperation.
- Support and facilitate the learning process by valuing learners' contributions in the class activity.
- Guide student towards the harmonization of their findings.
- Encourage individual, peer and group evaluation of the work done in the classroom and use appropriate competence-based assessment approaches and methods.

To facilitate you in your teaching activity, the content of this Teacher's Book is self-explanatory so that you can easily use it. It is divided in 3 parts:

The part 1: Explains the structure of this book and gives you methodological guidance;

The part 2: Gives the sample lesson plans as reference for your lesson planning process;

The part 3: Provides details on the teaching guidance for each concept given in the student's book.

Even though this Teacher's Book contains the answers for all activity given in the learner's book, you are requested to work through each question and activity before judging learner's findings.

I wish to sincerely appreciate all people who contributed towards the development of this Teacher's Book, particularly REB staff who organized the whole process from its inception. Special gratitude goes to the University of Rwanda which provided experts in design and layout services and teachers who diligently worked to the successful completion of this book.

Any comment or contribution would be welcome for the improvement of this teacher's guide for the next edition.

Dr. MBARUSHIMMANA Nelson
Director General of REB

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Joan MURUNGI,
Head of CTLR Department

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PART I. GENERAL INTRODUCTION

About the teacher's guide

This book is a teacher's guide for ICT subject, for senior four in General education. It is designed to accompany student book and intends to help teachers in the implementation of competence based curriculum specifically ICT syllabus.

As the name says, it is a guide that teachers can refer to when preparing their lessons. Teachers may prefer to adopt the guidance provided but they are also expected to be more creative and consider their specific classes' contexts and prepare accordingly.

I.0. The structure of the guide

This section presents the overall structure, the unit and sub-heading structure to help teachers to understand the different sections of this guide and what they will find in each section.

Overall structure

The whole guide has three main parts as follows:

❖ Part I: General Introduction.

This part provides general guidance on how to develop the generic competences, how to integrate cross cutting issues, how to cater for students with special educational needs, active methods and techniques of ICT and guidance on assessment.

❖ Part II: Sample lesson plan

This part provides a sample lesson plan, developed and designed to help the teacher develop their own lesson plans.

❖ Part III: Unit development

This is the core part of the guide. Each unit is developed following the structure below. The guide ends with references.

Each unit is made of the following sections:

- **Unit title:** from the syllabus
- **Key unit competence:** from the syllabus
- **Prerequisites (knowledge, skills, attitudes and values)**

This section indicates knowledge, skills and attitudes required for the success of the unit. The competence-based approach calls for connections between units/topics within a subject and interconnections between different subjects. The teacher will find an indication of those prerequisites and guidance on how to establish connections.

- Cross-cutting issues to be addressed

This section suggests cross cutting issues that can be addressed depending on the unit content. It provides guidance on how to come up with the integration of the issue. Note that the issue indicated is a suggestion; teacher are free to take another cross-cutting issue taking into consideration the learning environment.

- Guidance on the introductory activity

Each unit starts with an introductory activity in the teacher's book. This section of the teacher's guide provides guidance on how to conduct this activity and related answers. Note that students may not be able to find the right solution but they are invited to predict possible solutions or answers. Solutions are provided by students gradually through discovery activities organized at the beginning of lessons or during the lesson.

- **List of lessons/sub-heading**

This section presents in a table suggestion on the list of lessons, lesson objectives copied or adapted from the syllabus and duration for each lesson. Each lesson /subheading is then developed.

- **End of each unit**

At the end of each unit the teacher provides the following sections:

- Summary of the unit which provides the key points of content developed in the teacher's book.
- Additional information which provides additional content compared to the student book for the teacher to have a deeper understanding of the topic.
- End unit assessment which provides answers to questions of the end unit assessment in the teacher's book and suggests additional questions and related answers to assess the key unit competence.
- Additional activities :(remedial, consolidation and extended activities). The purpose of these activities is to accommodate each student (slow, average and gifted) based on the end of unit assessment results.

Structure of each sub heading

Each lesson/sub-heading is made of the following sections:

Lesson /Sub heading title 1:

- **Prerequisites/Revision/Introduction:**

This section gives a clear instruction to teacher on how to start the lesson.

- **Teaching resources**

This section suggests the teaching aids or other resources needed in line with the activities to achieve the learning objectives. Teachers are encouraged to replace the suggested teaching aids by the available ones in their respective schools and based on learning environment.

- **Learning activities**

This section provides a short description of the methodology and any important aspect to consider. It provides also answers to learning activities with cross reference to student's book.

- **Exercises/application activities**

This provides questions and answers for exercises/ application activities.

I.1. Methodological guidance

I.1.1. Developing competences

Since 2015 Rwanda shifted from a knowledge based to a competence based curriculum for pre-primary, primary and general secondary education. For General education, it is in 2016 that the competence based curriculum was embraced. This called for changing the way of learning by shifting from teacher centered to a learner centered approach. Teachers are not only responsible for knowledge transfer but also for fostering teacher's learning achievement, and creating safe and supportive learning environment. It implies also that a student has to demonstrate what he/she is able to do using the knowledge, skills, values and attitude acquired in a new or different or given situation.

The competence-based curriculum employs an approach of teaching and learning based on discrete skills rather than dwelling on only knowledge or the cognitive domain of learning. It focuses on what learner can do rather than what learners know. Students develop basic competences through specific subject unit competences with specific learning objectives broken down into knowledge, skills and attitudes. These competences are developed through learning activities disseminated in learner-centered rather than the traditional didactic approach. The students are evaluated against set standards to achieve before moving on.

In addition to specific subject competences, students also develop generic competences which are transferable throughout a range of learning areas and situations in life. Below are examples of how generic competences can be developed in Biology:

Generic competence	Examples of activities that develop generic competences
Critical thinking	<ul style="list-style-type: none">- Describe the relationship and interdependence of sciences- Observe, record, interpret data recorded during experiments- Identify and use the applications of ICT concepts to solve problems of life and society
Research and Problem solving	<ul style="list-style-type: none">- Research using internet or books from the library- Design a project for making bioplastics- Design a questionnaire for data collection during field visit
Innovation and creativity	<ul style="list-style-type: none">- Create an experiment procedure to prove a point- Develop a graph to illustrate information- Design a data collection survey/questionnaire- Conduct experiments with objectives, methodology, observations, results, conclusions- Identify local problems and ways to resolve them
Cooperation, Personal and Interpersonal management and life skills	<ul style="list-style-type: none">- Work in Pairs- Small group work- Large group work

Communication	<ul style="list-style-type: none"> - Organise and present in writing and verbally a complete and clear report of an experiment - Observe, record, interpret the results of a measurement accurately. - Select and use appropriate formats and presentations, such as tables, graphs and diagrams.
Lifelong learning	<ul style="list-style-type: none"> - Exploit all opportunities available to improve on knowledge and skills. Reading scientific journals to keep updated.

I.2.2. Addressing cross cutting issues

Among the changes in the competence based curriculum is the integration of cross cutting issues as an integral part of the teaching learning process-as they relate to and must be considered within all subjects to be appropriately addressed. The eight cross cutting issues identified in the national curriculum framework are: genocide studies, environment and sustainability, gender, Comprehensive Sexuality Education (CSE), Peace and Values Education, Financial Education, standardization Culture and Inclusive Education.

Some cross cutting issues may seem specific to particular learning areas or subjects but the teacher needs to address all of them whenever an opportunity arises. In addition, student should always be given an opportunity during the learning process to address these cross cutting issues both within and out of the classroom so as to progressively develop related attitudes and values.

Below are examples on how crosscutting issues can be addressed in Biology:

Cross-cutting issues	Examples on how to integrate the cross-cutting issues
Inclusive education	Involve all students in all activities without any bias. Eg: Allow a student with physical disability (using wheelchair) to take notes or lead the team during an experiment.
Gender	Involve both girls and boys in all activities: No activity is reserved only to girls or boys. Teacher should ensure equal participation of both girls and boys during experiments as well as during cleaning and tidying up related activities after experiments.
Peace and Values Education	During group activities, debates and presentations, the teacher will encourage students to help each other and to respect opinions of colleagues.
Standardization culture	<ul style="list-style-type: none"> - Some lessons involve carrying out experiments. Instruction should be clear for students to always check if they are not using expired chemicals or defective apparatus.

	<ul style="list-style-type: none"> - In addition, when performing experiments students have to record data accurately. - For tasks involving calculations, they have to always present accurate results.
Environment and sustainability	<ul style="list-style-type: none"> - In order to avoid the environment pollution, before, during or after experiments students avoid throwing away chemicals anywhere; special places or appropriate containers should be used. - Students also have to be aware of the impacts of the use of hydrocarbons as fuels, halogenoalkanes, and plastics on the environment.
Financial Education	When performing experiments, students are encouraged to avoid wasting chemicals by using the quantities that are just required. They are required to also avoid spoiling equipments and other materials...

I.2.3. Attention to special educational needs specific to each subject

In the classroom, students learn in different way depending to their learning pace, needs or any other special problem they might have. However, the teacher has the responsibility to know how to adopt his/her methodologies and approaches in order to meet the learning needs of each student in the classroom. Also teacher must understand that students with special needs need to be taught differently or need some accommodations to enhance the learning environment. This will be done depending on the subject and the nature of the lesson.

In order to create a well-rounded learning atmosphere, teacher needs to:

- Remember that students learn in different ways so they have to offer a variety of activities (e.g. role-play, music and singing, word games and quizzes, and outdoor activities).
- Maintain an organized classroom and limits distraction. This will help students with special needs to stay on track during lesson and follow instruction easily.
- Vary the pace of teaching to meet the needs of each student. Some students process information and learn more slowly than others.
- Break down instructions into smaller, manageable tasks. Students with special needs often have difficulty understanding long-winded or several instructions at once. It is better to use simple, concrete sentences in order to facilitate them understand what you are asking.
- Use clear consistent language to explain the meaning (and demonstrate or show pictures) if you introduce new words or concepts.
- Make full use of facial expressions, gestures and body language.
- Pair a student who has a disability with a friend. Let them do things together and learn from each other. Make sure the friend is not over protective and does not do everything for the student. Both students will benefit from this strategy

- Use multi-sensory strategies. As all students learn in different ways, it is important to make every lesson as multi-sensory as possible. Students with learning disabilities might have difficulty in one area, while they might excel in another. For example, use both visual and auditory cues.

Below are general strategies related to each main category of disabilities and how to deal with every situation that may arise in the classroom. However, the list is not exhaustive because each student is unique with different needs and that should be handled differently.

Strategy to help students with developmental impairment:

- Use simple words and sentences when giving instructions.
- Use real objects that the student can feel and handle, rather than just working abstractly with pen and paper.
- Break a task down into small steps or learning objectives. The student should start with an activity that s/he can do already before moving on to something that is more difficult.
- Gradually give the student less help.
- Let the student work in the same group with those without disability.

Strategy to help students with visual impairment:

- Help students to use their other senses (hearing, touch, smell and taste) to play and carry out activities that will promote their learning and development.
- Use simple, clear and consistent language.
- Use tactile objects to help explain a concept.
- If the students have some sight, ask them what they can see. Get information from parents / caregivers on how the student manages their remaining sight at home.
- Make sure the student has a group of friends who are helpful and who allow the students to be as independent as possible.
- Plan activities so that students work in pairs or groups whenever possible.

Strategy to help students with hearing impairment:

- Strategies to help students with hearing disabilities or communication difficulties
- Always get the students attention before you begin to speak.
- Encourage the student to look at your face.
- Use gestures, body language and facial expressions.
- Use pictures and objects as much as possible.
- Ask the parents/caregivers to show you the signs they use at home for communication use the same signs yourself and encourage other students to also use them.
- Keep background noise to a minimum.

Strategies to help children with physical disabilities or mobility difficulties:

- Adapt activities so that student who use wheelchairs or other mobility aids, or other students who have difficulty moving, can participate.
- Ask parents/caregivers to assist with adapting furniture e.g. The height of a table may need to be changed to make it easier for a student to reach it or fit their legs or wheelchair under.
- Encourage peer support friends can help friends.
- Get advice from parents or a health professional about assistive devices.

I.2.4. Guidance on assessment

Each unit in the teacher's guide provides additional activities to help students achieve the key unit competence. Results from assessment inform the teacher which student needs remedial, consolidation or extension activities. These activities are designed to cater for the needs of all categories of learners; slow, average and gifted learners respectively.

Assessment is an integral part of teaching and learning process. The main purpose of assessment is for improvement. Assessment for learning/ **Continuous/ formative assessment** intends to improve students' learning and teacher's teaching whereas assessment of learning/summative assessment intends to improve the entire school's performance and education system in general.

Continuous/ formative assessment

It is an ongoing process that arises out of interaction during teaching and learning process. It includes lesson evaluation and end of sub unit assessment. This formative assessment plays a big role in teaching and learning process. The teacher should encourage individual, peer and group evaluation of the work done in the classroom and uses appropriate competence-based assessment approaches and methods.

In Year two textbook, formative assessment principle is applied through application activities that are planned in each lesson to ensure that lesson objectives are achieved before moving on. At the end of each unit, the end unit assessment is formative when it is done to give information on the progress of students and from there decide what adjustments need to be done. Assessment standards are taken into consideration when setting tasks.

Summative assessment

The assessment done at the end of the term, end of year, is considered as summative. The teacher, school and parents are informed on the achievement of educational objectives and think of improvement strategies. There is also end of level/ cycle assessment in form of national examinations.

I.2.5. Student learning styles and strategies to conduct teaching and learning process

There are different teaching styles and techniques that should be catered for. The selection of teaching method should be done with the greatest care and some of the factors to be considered are: the uniqueness of subjects, the type of lessons, the particular learning objectives to be achieved, the allocated time to achieve the objective, instructional available materials, the physical/sitting arrangement of the classroom, individual student needs, abilities and learning styles.

There are mainly four different learning styles as explained below:

a) Active and reflective learners

Active learners tend to retain and understand information best by doing something active with it, discussing or applying it or explaining it to others. Reflective learners prefer to think about it quietly first.

b) Sensing and intuitive learners

Sensing learners tend to like learning facts while intuitive learners often prefer discovering possibilities and relationships. Sensors often like solving problems by well-established methods and dislike complications and surprises; intuitive learners like innovation and dislike repetition.

c) Visual and verbal learners

Visual learners remember best what they see (pictures, diagrams, flow charts, time lines, films, demonstrations, etc.); verbal learners get more out of words (written and spoken explanations).

d) Sequential and global learners

Sequential learners tend to gain understanding in linear steps, with each step following logically from the previous one. Global learners tend to learn in large jumps, absorbing material almost randomly without seeing connections, and then suddenly “getting it.”

I.2.6. Teaching methods and techniques that promote the active learning

The different student learning styles mentioned above can be catered for, if the teacher uses active learning whereby students are really engaged in the learning process.

What is Active learning?

Active learning is a pedagogical approach that engages students in doing things and thinking about the things they are doing. In active learning, learners are encouraged to bring their own experience and knowledge into the learning process.

The role of the teacher in active learning

- The teacher engages students through active learning methods such as inquiry methods, group discussions, research, investigative activities and group and individual work activities.
- He/she encourages individual, peer and group evaluation of the work done in the classroom and uses appropriate competence-based assessment approaches and methods.
- He provides supervised opportunities for students to develop different competences by giving tasks which enhance critical thinking, problem solving, research, creativity and innovation, communication and cooperation.

- Teacher supports and facilitates the learning process by valuing students' contributions in the class activities.

The role of learners in active learning

Learners are key in the active learning process. They are not empty vessels to fill but people with ideas, capacity and skills to build on for effective learning. A learner engaged in active learning:

- Communicates and shares relevant information with other learners through presentations, discussions, group work and other learner-centred activities (role play, case studies, project work, research and investigation)
- Actively participates and takes responsibility for their own learning
- Develops knowledge and skills in active ways
- Carries out research/investigation by consulting print/online documents and resourceful people, and presents their findings
- Ensures the effective contribution of each group member in assigned tasks through clear explanation and arguments, critical thinking, responsibility and confidence in public speaking
- Draws conclusions based on the findings from the learning activities.

Some active techniques that can be used in Biology

The teaching methods strongly emphasised in the competence Based Curriculum (CBC) are active methods. Below are some active techniques that apply in sciences:

A. Practical work/ experiments:

Many of the activities suggested in ICT curriculum as well as in the teacher's book are practical works or experiments.

Practical work is vital in learning Biology; this method gives the student the opportunity to implement a series of activities and leads to the development of both cognitive and hands-on skills. The experiments and questions given should target the development of the following skills in students: observation, recording and report writing, manipulation, measuring, planning and designing.

A practical lesson/Experiment is done in three main stages:

- **Preparation of experiment:** Checking materials to ensure they are available and at good state; try the experiment before the lesson; think of safety rules and give instructions to lab technician if you have any.
- **Performance of experiment:** Sitting or standing arrangement of students; introduction of the experiment: aims and objectives; setting up the apparatus; performing the experiment; write and record the data.
- **Discussion:** Observations and interpreting data; make generalisations and assignment: writing out the experiment report and further practice and research.

In some cases, demonstration by the teacher is recommended when for example the experiment requires the use of sophisticated materials or very expensive materials or when safety is a major factor like dangerous experiments and it needs specific skills to be learnt first.

In case your school does not have enough laboratory materials and chemicals, experiments can be done in groups but make sure every student participates. You can also make arrangements with the neighbouring science school and take your students there for a number of experiments.

B. Research work

Each student or group of students is given a research topic. They have to gather information from internet, available books in the library or ask experienced people and then the results are presented in verbal or written form and discussed in class.

C. Project work

ICT teachers are encouraged to sample and prepare project works and engage their students in, as many as possible. Students in groups or individually, are engaged in a self-directed work for an extended period of time to investigate and respond to a complex question, problem, or challenge. The work can be presented to classmates or other people beyond the school. Projects are based on real-world problems that capture learners' interest. This technique develops higher order thinking as the students acquire and apply new knowledge in a problem-solving context.

D. Field trip

One of the main aims of teaching ICT in Rwanda is to apply its knowledge for development. To achieve this aim we need to show to students the relationship between classroom science lessons and applied sciences. This helps them see the link between science principles and technological applications.

To be successful, the field visit should be well prepared and well exploited after the visit:

Before the visit, the teacher and student:

- agree on aims and objectives
- gather relevant information prior to visit
- brainstorm on key questions and share responsibilities
- discuss materials needed and other logistical and administrative issues
- discuss and agree on accepted behaviours during the visit
- Visit the area before the trip if possible to familiarise yourself with the place

After the visit

When students come back from trip, the teacher should plan for follow-up. The follow-up should allow students to share experiences and relate them to the prior science knowledge. This can be done in several ways; either: Students write a report individually or in groups and give to the teacher for marking. The

teacher then arranges for discussion to explain possible misconceptions and fill gaps. Or students write reports in groups and display them on the class notice board for everyone to read.

Main steps for a lesson in active learning approach

All the principles and characteristics of the active learning process highlighted above are reflected in steps of a lesson as displayed below. Generally, the lesson is divided into three main parts whereby each one is divided into smaller steps to make sure that students are involved in the learning process. Below are those main parts and their small steps:

1) Introduction

Introduction is a part where the teacher makes connection between the current and previous lesson through appropriate technique. The teacher opens short discussions to encourage students to think about the previous learning experience and connect it with the current instructional objective. The teacher reviews the prior knowledge, skills and attitudes which have a link with the new concepts to create good foundation and logical sequencings.

2) Development of the new lesson

The development of a lesson that introduces a new concept will go through the following small steps: discovery activities, presentation of students' findings, exploitation, synthesis/summary and exercises/application activities, explained below:

❖ Discovery activity

Step 1

- The teacher discusses convincingly with students to take responsibility of their learning
- He/she distributes the task/activity and gives instructions related to the tasks (working in groups, pairs, or individual to instigate collaborative learning, to discover knowledge to be learned)

Step 2

- The teacher let the students work collaboratively on the task.
- During this period the teacher refrains to intervene directly on the knowledge
- He/she then monitors how the students are progressing towards the knowledge to be learned and boost those who are still behind (but without communicating to them the knowledge).

❖ Presentation of students' productions

- In this episode, the teacher invites representatives of groups to present the students' productions/findings.
- After three/four or an acceptable number of presentations, the teacher decides to engage the class into exploitation of the students' productions.

❖ Exploitation of student's productions

- The teacher asks the students to evaluate the productions: which ones are correct, incomplete or false

- Then the teacher judges the logic of the students' products, corrects those which are false, completes those which are incomplete, and confirms those which correct.
- ❖ **Institutionalization (summary/conclusion/ and examples)**
 - The teacher summarises the learned knowledge and gives examples which illustrate the learned content.
- ❖ **Exercises/Application activities**
 - Exercises of applying processes and products/objects related to learned unit/sub-unit
 - Exercises in real life contexts
 - Teacher guides students to make the connection of what they learnt to real life situations. At this level, the role of teacher is to monitor the fixation of process and product/object being learned.

3) Assessment

In this step the teacher asks some questions to assess achievement of instructional objective. During assessment activity, students work individually on the task/activity. The teacher avoids intervening directly. In fact, results from this assessment inform the teacher on next steps for the whole class and individuals. In some cases, the teacher can end with a homework assignment.

PART II. SAMPLE LESSON PLAN

Term	Date	Subject	Class	Unit No	Lesson No	Duration	Class size
I	X	ICT	Senior Four	1		40	35
Type of Special Educational Needs to be catered for in this lesson and number of learners in each category					Mild hearing impairment (1) Low vision (1)		
Unit title			ADVANCE WORD PROCESSING				
Key Unit Competence:			Apply advanced skills to create suitable word documents				
Title of the Lesson			Formatting a document				
Instructional Objective			Describe different way of formatting a text Apply different methods to format a text of a word document				
Plan for this Class (location: in / outside)			The lesson is to be conducted in the Computer Lab facilities				
Learning Materials (for all learners)			Computer Desktop or Computer Laptop for every student				
References			ICT Student Book Senior Four				
Timing for each step	Description of teaching and learning activity					Generic competences and cross cutting issues addressed	
	Using Word processing program, students are given texts to format by applying different methods used in formatting a text using a word processing programs, demonstrations on how to apply various formats in the Word document program is done, and finally, the text after the application of a specific format is analyzed by learners.						
	Teacher activities			Learner Activities			
Introduction (20 min)	Using a projector, the teacher displays unformatted text / document			Students observe the displayed text /document		Communication in official languages	
	Teacher ask students various questions concerning the way the text/document is presented			students respond to the teacher r's questions			

	<p>The teacher announces that at least everyone will be able to format a text or document by the end of the lesson and write the new topic</p> <p>The topic of the day is written on the writing board</p>		
<p>Development Of the lesson (50 min)</p> <p>A) Analysis I</p>	<p>The student asks students to open Ms Word on their computers.</p> <p>The teacher asks students to show and explain the role various Ribbon Tab Name that make of Ms Word</p>	<p>Learners respond by opening Ms Word on computers to Students explain the role of each Ribbon Tab Name available in Ms Word.</p> <p>Responses on the roles of different tabs are given</p>	<p>Creativity</p>
	<p>Teacher asks students to select write down a given a text into Word processing program</p> <p>Teacher does select (highlight) the text</p>	<p>Students discover Word Processing environment that consist of various Ribbon Tab and grouping</p>	

B) Analysis II	<ul style="list-style-type: none"> ▪ The teacher asks students to change the existing Font Type to new Font Type. ▪ The teacher asks students to change the existing font color to new Font Color ▪ Teacher asks students to make text bold, italic, and underlined ▪ Teacher demonstrates how to Changing text case 	<ul style="list-style-type: none"> ▪ Students change the existing Font Type to new Font Type. ▪ Students change the existing font color to new Font Color ▪ Students make text bold, italic, and underlined ▪ Students change text case 	<p>Creativity and innovation:</p> <p>while changing Font Type& Color</p> <p>Critical thinking:</p> <p>While changing text to Bold, Italic and Underline</p>
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C)Synthesis II	<input type="checkbox"/> Teacher guides students to apply different methods to format a text of a word document	<input type="checkbox"/> Students use the instruction given by teacher to apply different methods to format a text of a word document	
	Summary on the application of different methods to format a text of a word document	Students discover various method to apply different while formatting a text of a word document	
Conclusion 10 min	Teacher gives homework tasks to consolidate what has been learnt and one example is done for/by learners	Homework: Using different methods to format a text of a word document	
Teacher self evaluation			

PART III. UNIT DEVELOPMENT

UNIT 1: COMPUTER MAINTENANCE

1.1. Key Unit competence

To maintain a computer in good working condition and describe the role of each of its components.

1.2. Prerequisites

Students have learnt some concepts of computer hardware and software in Ordinary level. They ideally have some knowledge and skills related to computer hardware and computer software. This concept will help students to apply computer maintenance principles, to install some software from known source.

1.3. Cross-cutting issues to be addressed

Throughout every lesson, cross cutting issues must be addressed. Addressing cross cutting issues makes a lesson not to be an isolated entity but relate the lesson with the issues in real world. Here below are some cross-cutting issues to be addressed:

Inclusive Education: Students with and without disabilities participate together in the same classes during teaching and learning process.

Standardization Culture: to be covered when explaining the standards required during installation of system software and application software and factors that need to be considered in order to minimize health risks such as RSI (Repetitive Strain Injuries) and eye strain while using computer. Students must be familiar with the standards of computer hardware devices and software by making sure that they always have to use devices and software from known manufactures

Gender education: All students must get involved in class activities regardless of gender

1.4. Guidance on introductory activity

Though the guidance of the teacher, referring to the image in student book
instruct students to observe the image on the computer being repaired carefully
Teacher let students discuss about the image observed

1.5. List of lessons

#	Lesson title	Learning objectives	Periods
1	Elements of the computer system unit and their roles:	Identifying the elements of the computer system unit and give their roles	3

2	Computer maintenance principles	Apply computer maintenance principles to ensure that computer remains in normal working condition	1
3	Computer capacity:	Identify the measurements of computer capacity and read memory size and processor speed of a computer	2
4	Identifying and addressing hardware issues	Identify and address hardware problems and fix them	1
5	Assembling a computer & Disassembling a computer	To assemble and disassemble a computer by respecting the procedural steps	3
6	Software installation principles	Identify types of computer software and system requirement to install any software	2
7	Computer software issues:	Identify operating system issues and software issues and fix them	1
8	Computer software installation: Installation of an OS,	Explain and apply different steps to install an operating system	2
9	Computer software installation: Installation of an Application software	Explain and apply different steps to install an application software	2
	End Unit assessment		1

Lesson 1: Elements of the computer system unit and their role

a) Learning objectives

Identifying the elements of the computer system unit and give their roles

b) Teaching resources:

This lesson needs regular used materials such as computers connected to the internet to conduct more research, projector, computers for maintenance, a student text book with teacher's guide and manufacturer's manual.

c) Prerequisites:

Students have basic knowledge and skills about input and output devices learnt in ordinary level, they should also be familiar with some internal components that they find in phones and other electronic devices.

d) Learning activities

● Guidance

This topic introduces the students to the various components found inside system unit of a typical computer. Due to the sensitivity of most of these components, during demonstration intended to practically identify these components, let the students observe caution when handling the components. In this case:

- a. Under the guidance of the students observe the image in the activity 1.1. They identify the parts they see in the image
- b. Teacher opens the computer case of some available computers for the students to be able to see the internal components.
- c. Students identify the different components and their roles
- d. The teacher gives guidance on how to do activity 1.1 and application activity 1.1

● Answers to Activity 1.1

1a&b) Through observations students identify various components inside the system unit and their role. Refer to the students book various components inside the system unit and their role.

e) Application activity

Answers to application activity 1.1:

- Teacher guides students to identify different ports available on either laptop or desktop such as: Mouse port and keyboard sometime known as PS2 port, VGA Port, USB Port, Parallel Port, Serial port, HDMI port, Digital Video Interface (DVI), Audio Ports etc

2. After searching the internet students explain primary, secondary and tertiary memory

- **Primary storage:** Also known as Main memory is a type of storage that is directly accessible by the processor. Example of primary memory are ROM and RAM

Secondary storage: Secondary storage, also referred to as auxiliary storage, are devices that provide alternative long-term storage for programs, data and information. Because of their large capacity they also referred to as mass storage devices. They are regarded as secondary because unlike primary storage, they are not directly accessible by the CPU.

Tertiary storage: The main purpose of tertiary computer storage is to store data on a very large scale. This includes optical jukeboxes and tape libraries. They require a database to organize the data stored in them.

- Some storage devices are called mass storage because they can store large amount of data for a long time.

Lesson 2: Computer maintenance principles

● Learning objectives

Apply computer maintenance principles to ensure that computer remain in normal working condition

- **Teaching resources:**

Devices like computers, projector, and repair tool kit, some samples of ergonomics equipment like mouse, keyboard, screen, and chair are needed to conduct the lesson in an effective manner.

- **Prerequisites**

Students are aware and familiar with the problems related to malfunction of electronic devices such as radio, computer and printer. They also have knowledge and skills on proper use of cleaning tools learnt in ordinary level

- **Learning activities**

- **Guidance**

- Teacher groups students into small groups so that they share ideas on the principles of maintaining a computer
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

- **Answers to Activity 1.2**

- The activity in question one requires the student to identify factors such as poor sitting posture, prolonged use of computers, ventilation, poor display unit and electric shock, etc.
- Drinks by drop on computer accessories causing short circuit or damage to electrical parts while solid food substances may cause blockage of moving parts or keys on the keyboard

- **Application activity**

Answers to application activity 1.2

- Maintenance keeps the computer working at optimum level and prevents unnecessary breakdowns caused by dirt, water or other kinds of misusing computer.
- Use different preventive maintenance such as using blower to blow out dust, wipe the computer clean with a soft absorbent piece of cloth and non-water based cleaner liquid, etc.

Lesson 3: Computer capacity

a) Learning objectives

Identify the measurements of computer capacity and read memory size and processor speed of a computer

b) Teaching resources:

This lesson could be conducted in computer lab with a projector for presentation, different removable devices such as flash disk, memory card, hard disk, CD/DVD will also be needed for more clarification on memory capacity. The syllabus and the student book are also needed.

c) Prerequisites:

Students have knowledge about the size of different storage devices (memory card, flash disk, CD/DVD) used in some electronic devices such as phone, radio and computers

d) Learning activities

● **Guidance**

- On the instruction of the teacher, students analyze the scenario in the activity 1.3 and answer the questions in that activity
- Students identify the measurements of the computer capacity (memory and processor speed) and brainstorm on how to view those properties in the computer
- The teacher demonstrates using a projector how to view the memory size and processor speed of a computer and students follow suit
- Teacher walks around and checks if students doing as per the given demonstration.
- Teacher gives guidance on how to do application activity 1.3.

● **Answers to Activity 1.3**

- The activity 1.3 require students to use their brainstorming, some suggestions may be to advise Peter to buy a flash a disk of higher capacity
- The size of each film is 512 MB as 1GB is equivalent to 1024MB but for simplicity reasons 1GB is equal to 1000MB.

e) **Answers to application activity 1.3**

First convert the capacity of the DVD in MB

The 4.7GB are equal to $1024\text{MB} * 4.7 = 4812.8\text{MB}$

The number of CDs in one DVD equal to $4812.8\text{MB} / 700\text{MB} = 6.87$

As there cannot be parts of a CD the total number of CDs is 7 (**A DVD can store data that can be stored on 7 CDs**)

- 4Gb is equivalent to $4 * 1024\text{MB} = 4096\text{Mb}$

If 4Mb are downloaded in to 6sec

Then 1 MB is downloaded in $6\text{sec} / 4$

Therefore, 4GB will be downloaded in $6\text{sec} / 4 * 4096$ seconds (which is 6144 seconds)

Lesson 4: Identifying and addressing hardware issues

a) **Learning objectives**

Identify and address hardware problems and fix them

b) **Teaching resources**

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and a tool to use in case the issue requires opening the computer case. The lesson will also require having the student book and the syllabus.

c) **Prerequisites**

Students should have knowledge and skills related to computer maintenance, General precautions, power connectivity and precautions for connecting the mouse, keyboard, and other external peripherals. They will have acquired these basic competences from lower secondary.

d) Learning activities

● **Guidance**

- The teacher takes one computer with an issue and present it to the class under the guidance of the students identify the problem may have
- The teacher switch on a computer with improperly fixed hardware component so that the computer emits a POST sound of warning
- For every other problem (Blank monitors, Mouse Problems. Computer does not recognize USB, Keyboard Problems, Power Cord Problems ...) the teacher shows a computer or an image or a video with such a problem and students brainstorm on it.

● **Answers to Activity 1.4**

To connect both projector and monitor to a single computer requires that the computer have two VGA ports or an adapter having two VGA ports

e) Application activity

Answers to application activity 1.4

This activity requires students to discuss about hardware problems of their school computer lab. Students also discuss about possible solutions to the identified problems.

Lesson 5: Assembling a computer & disassembling a computer

a) Learning objectives

To assemble and disassemble a computer by respecting the procedural steps

b) Teaching resources:

The needed materials for this lesson are: computer preferably with internet connectivity to facilitate additional researches, projector, screw driver set, electric blower, internal parts of a computer that can be used to replace those with issues.

c) Prerequisites

Students have knowledge of tools used to open and connect together electronic devices like radio, phones and some of them are similar to those to assemble and disassemble a computer. They are familiar with some problems of computers though they are not able to solve them.

d) Learning activities

● **Guidance**

This topic requires practical approach to take the students through step-by step process of assembling and disassembling a computer.

- a. The teacher shows the different components found in the computer case and tells students that they are going to assemble them in the computer case
- b. Step by step and under the guidance of the students assemble the dismantled computer

● **Answers to Activity 1.5**

- This is an observation activity that requires the students to identify various tools such as extended extractor, antistatic wrist member, screw drivers and Ethernet crimping tools in a computer repair toolbox.
- Students explain the reasons that may prompt a technician to remove any internal part of a computer

e) **Application activity**

▪ **Answers to application activity 1.5**

1) This is a practical activity that requires the guidance of the teacher or qualified lab technician to assist the students mount a motherboard in the system unit. This procedure should be handled with care to avoid electric shock or damaging the motherboard.

2) The question 2 in application activity require teacher to let student to use their brainstorming and discuss about different types of expansion card here below are some suggestion:

- Industry Standard Architecture (ISA), Extended ISA (EISA),
- Peripheral Component Interconnect (PCI);
- Accelerated Graphics Ports (AGP);
- Video Electronics Standards Association (VESA);
- Audio Modem Riser (AMR);
- Communication Network Riser (CNR). Network Card, Sound Card, Video capture card, Video Card, etc.

Lesson 6: Software installation principles

a) **Learning objectives**

Identify types of computer software and system requirement to install any software

b) **Teaching resources:**

Student book, manual user guide and computer, internet connectivity for research, different software to install, computers to use in carrying out installations

c) **Prerequisites**

Students have knowledge and skills on computer capacity learned in “lesson 3: Computer capacity” in which they were also taught about processor speed

d) **Learning activities**

● **Guidance**

- Before the introduction of this topic, it is important that teacher searches for basic requirement needed so that user can install any software. The reason is not every computer

can support any software and run it. This depends on the different factors like processor speed and memory.

- The teacher connects a computer to a projector and tries to install a software on a computer that does not have the necessary system requirements
- Students brainstorm the reason why the software failed to install
- Students brainstorm the system requirements for common software found in the school's computers
- Under the guidance of the teacher system requirements of Windows 10 are discussed and examples of applications software incompatible with it are also discussed

● **Answers to Activity 1.6**

1. Importance of reading the user manual before installing new software is helpful for different reasons such as: The manufacturer's user manual is important in identifying the hardware specifications required in order to install the new software; It helps to know the procedures to follow in order to install the new software, it can also help to know whether the software being installed is genuine or not
2. Students give the factors to consider while purchasing application software
3. For this question refer to the student book

e) **Application activity**

Answers to application activity 1.6

Students do the questions in application activity 1.6 and the teacher guides them

Lesson 7: Computer software issues

a) **Learning objectives**

Identify operating system issues and software issues and fix them

b) **Prerequisites:**

Students are familiar with the use of computer and other electronic devices they also have basic knowledge bad software like viruses as they learnt it in ordinary level

c) **Teaching resources**

To teach this lesson requires:

- Having computers preferably one for each student,
- Computer with software issues that are going to be solved
- Internet connectivity for additional researches and downloading some software that will be needed
- ICT student's book and the syllabus

d) **Learning activities**

● **Guidance**

- teacher asks questions to students aimed at finding answers to questions in activity 1.7

- teacher shows computers with issues presented in the student book. Where such a computer cannot be found the teacher uses an image or a video
- For each issue, students identify the causes, the symptoms and how to solve the issue

● **Answers to Activity 1.7**

Let students carry out the activity in their respective groups and guide them to describe what happens to the computers after doing the activity. Let students discuss the measure that can be taken

e) Application activity

Answers to application activity 1.7

1. The first question in application activity 1.7 requires the student to search on the internet other common sources of computer virus that have not been seen in student book
2. This is an exploratory activity that requires the student to brainstorm on various means of acquiring software such as download, buying from vendors or developing their own software.
3. The activity requires the student practically perform disk cleanup procedure by following the steps provided in the student's book or using cleanup in the search box to display Disk Cleanup utility on the startup menu.

Lesson 8: Computer software installation

(Installation of an Operating System)

a) Learning objectives

Explain and apply different steps to install an operating system

b) Teaching resources

For teaching this lesson we will need Computers, Projector, Software, External Hard Disk, bootable Flash Disk or Windows Genuine installation DVD.

c) Prerequisites

Students are familiar with software installation skills applied in ordinal level senior three. They may also have basic skills about the installation of some application software in the phones.

d) Learning activities

● **Guidance**

- This activity takes place in the computer lab where teacher form group of at least five students
- Teacher starts the lesson by asking student to give the name of the program they likely to use
- The teacher asks students to carry out Activity 1.8 in their respective groups.
- An operating system is installed on a computer connected to the projector and at each step of the installation student describe what they see.
- In groups students install an operating system and describe each step

● **Answers to Activity 1.8**

The first program that teacher or lab technician need to install first is the operating system because it is the only software which manages hardware and application software resources and without operating system computer cannot boot.

e) Application activity

Answers to application activity 1.8

Referring to the steps provided in the student book, students do questions in application activity 1.8

Lesson 9: Computer software installation

(Installation of application software)

a) Learning objectives

Explain and apply different steps to install an application software

b) Teaching resources

To conduct this lesson requires having computers as the lesson will be conducted in the computer lab. There will also be a need of a projector for displaying examples to students, installation CD/DVD for Microsoft Office 2013, flash disk to use for installation. There will be a need for internet connectivity in case some software need to be downloaded.

c) Prerequisites

Students are already familiar with installation of some application in their smart phone which is so much like the installation of application software into a computer. They also have basic skills and knowledge about installation of software from known manufactures acquired in senior three

d) Learning activities

● **Guidance**

- The teacher starts the lesson by doing a theory recapitulation on basic principle of software installation together with the process of installing operating system.
- teacher organizes students in pairs in order to do the lesson's activity.
- Students give examples of application softwares and state which ones they know to install
- One student comes and install office by using a computer connected to a projector. With other students each step reached is explained
- Students install other application software on their computers like VLC, YouTube downloader, ...

● **Answers to Activity 1.9**

a&b) Teacher summarizes the contents and explains to students that the problem of John's computer is regarding to the missing of specialized programs to carry out each desired task.

To overcome the issue John needs to install appropriate program to play music VLC for example and other appropriate program to helping him to open his document such as Microsoft office

e) Application activity

Answers to application activity 1.9

This activity requires the students to install Microsoft Office 2016 by referring to General procedure to Install Software in student book

1.6. Summary of the unit

Hardware refers to any physical or tangible part of a computer. It can be either external or internal. Internal components are all components that are found inside the system unit such as disk drives, motherboard, processor power supply, memory, etc. While external components of a computer also known as peripherals refer to all external devices connected to central housing known as the system unit such as mouse, keyboard, scanner, monitor, printer or storage devices such as a hard drive or flash drive, memory card. Peripherals devices are connected to the system unit through port.

Computer maintenance can be done on hardware and software. It requires addressing hardware and software issues and finding solutions to overcome those issues. In this topic computer Assembling and disassembling procedures have been discussed together with how to install software such as operating system and application software.

1.7. Additional information for teachers

To conduct computer maintenance students must be participative because most lessons of the topic require practical activities; different devices for practical should also be made available in order to enhance learning.

The use of modern technology such as us projector and internet is crucial because this enhance the quick lesson delivery and make students to be more attractive during the lesson delivering.

1.8. End Unit assessment

1. Students reflect on the rules followed while being in either computer lab, chemistry lab or physics lab.
2. This is a practical activity that requires the guidance of the teacher or qualified lab technician to assist students identify and replace CMOS battery mounted on a motherboard. The same procedure is repeated to replace the RAM. Notice that these procedures should be handled with care to avoid electric shock or damaging the motherboard
3. a) An operating system refers to a type of system software that manages the hardware resources and control execution of application programs installed on the computer.
b) The three phases taken by operating system during its installation are: copying files, installing features and drivers, and lastly configuring settings.

Basic functions of operating system:

The operating system is a resource manager. All the functions it performs are aimed at efficiently and effectively managing the resources of the computing machine. In groups students discuss the functions and present them to the class.

4. There are many factors to consider before purchasing application software some of them are software license, the use needs, the operating system environment, the hardware requirements needed to run the software, etc.
5. Motherboard is the first element to be installed because it is where all internal components of computer are interconnected and communicate one each other. Thus, you need to first install it and attach another internal device after

The reason why it is the last to be uninstalled is that during uninstall process you start by disconnecting all those parts connected to it and thus terminate by removing the motherboard which hold any attachable device.

1.9. Additional activities

1. a. Open at least three different documents from different application program installed on your computer
b. Press a combination of CTRL +ALT+ Delete. Go to the Task Manager.
c. Right click on first document, click on End Task. What do you observe? Does it still open or not? In which condition does the above combination can be helpful can be
2. Explain the steps followed once you need to uninstall application software from a computer:

1.9.1. Remedial activities

1. Discuss the following:
 - a. Various input devices and their functions
 - b. Various output devices and their functions
 - c. Storage devices
 - d. What are common problems of some of the devices cited in (a), (b) and (c)
2. The Central Processing Unit is the most important part of computer and is considered as brain of computer
 - a. Explain why this part is considered as brain of computer?
 - b. What is the function of the CPU
 - c. List and explain the parts of the central processing unit

1.9.2. Consolidation activities

1. a) Differentiate the term scanning from updating
b) Why is it advisable to scan any storage device connected to a computer

2. The process of installing more than one operating system inside one computer is known as “multi booting system” then you are asked to install window 10 and window 8 into your computer. Search on internet how to proceed this activity.

1.9.3. Extended activities

1. Define the term e-waste

The power supply inside the computer is used to convert alternative current into direct current, explain how you can replace it once damage.

UNIT 2. ADVANCED WORD PROCESSING

2.1. Key unit competence:

Apply advanced skills to create suitable word documents

2.2. Prerequisite

Students learnt in ordinary level how to open Microsoft word, save a document, identify Microsoft word tool bar, insert object, etc. they have basic skills which can allow them to acquire competences they are supposed get in advanced word processing.

2.3. Cross-cutting issues to be addressed:

- **Financial education:** Through typing scenario related to money management and do related application
- **Gender education:** All students must get involved in class activities regardless of gender
- **Inclusive Education:** Learners with and without disabilities participate together in the same classes during teaching and learning process
- **Peace and value** through typing a text describing peace

2.4. Guidance on introductory activity

The activities shown in the introductory activity are given to students as a homework at the end of Unit 2. The only thing to do in class is to project the different elaborated documents.

- Teacher makes students read the questions in the introductory activity and discuss on them
- Students are put into groups so as to perform activities shown in the introductory activity which is given to them as a homework
- Time is set aside to project the different groups' documents
- By analyzing the look of different documents presented the teacher becomes aware of the level of students in word and builds on that

2.5 List of lessons

#	Lesson title	Learning objectives	Number of periods
1	Formatting a Document	Describe different way of formatting a text Apply different methods to format a text of a word document	3
2	Paragraph group	Create and insert footnotes and endnotes	3
3	Referencing a word document	State the steps of creating and updating a table of content, referencing ,and protecting a document	3
4	Creating and updating a table of contents	Create and update a table of content	3
5	Page layout tab command	Make page set up by putting margin, page orientation and column	2
6	Protecting a document from unauthorized access and changes	Practice the way of protecting documents from unauthorized changes and authorize reviewer to insert comment and tracked changes only	2
7	End Unit Assessment		1

Lesson 1: Formatting a document

a) Learning objective

- Describe different way of formatting a text
- Apply different methods to format a text of a word document

b) Teaching resources

Instructional materials required for teaching and learning this lesson are Computers, projector, soft documents, text books, and the internet

c) Prerequisites

Ordinary level ICT: how to underline text, put it in italic, use bullets numbering etc.

d) Learning activities

● **Guidance**

- Teacher tell students to type a text and apply the required steps to change font type, font size, font color.
- Under the teacher’s guidance students put written text in upper case, underline it , make it bold and put it in italic

● **Answers to activity 2.1**

Students do this activity individually. Students open a blank document in Ms Word then type in the document this text “Hano Hari inzu ikodeshwa “and save it as”Inzu.docx” then apply on it the following:

- 1) Changing the font size to 36
- 2) Changing the font – type to Book Antiqua.
- 3) Changing the text font color to red.
- 4) Changing text to Bold Italic and Underline it.
- 5) Changing text to the UPPERCASE.

All steps on how to accomplish this are available in the students’ book.

e) Application activity 2.1

1. Students type the text of 3 paragraph describing peace and apply on it different font following the steps provided in student’s book: Change the first and second sentence to the font type = “Poor Richard” font size =”14”, font color = “Blue” and finally make sentences italic
2. Individually; students change the third and fourth sentence to the font type” Tahoma”, font size ”12”, font color” Red” and underline those sentences of the PEACE document all question two question will be done using steps found in student’s book on section formatting a document

Lesson 2: Paragraph group

a) Learning objective

Create and insert indent, spacing, bullets, numbering and alignment

b) Teaching resources

Computers, projector, soft documents, text books, and the internet

c) Prerequisites

Students have prior knowledge about bullets numbering and numbering list, add or remove borders, shading paragraph, find on paragraph group of Home tab.

d) Learning activity

● **Guidance**

- Students write the text that is going to be used in different formatting

- Teacher demonstrates how to perform different actions shown in the student book and learners follow suit
- As students are doing what is demonstrated, the teacher moves around to help those that may be having difficulties
- **Answers to activity 2.2**

1. Students type text which describe last holidays and try to apply on asked paragraph format find in paragraph group. And Teacher facilitate them so that to enter in new lesson with prior knowledge/ skills.

e) Application activities

Application activity 2.2

Student has to type a text from an English book and apply on it all asked format following all steps in student book: indenting the first sentence, changing the font type to “Time New Roman “, size =”12” , line spacing =”2.0, changing the alignment from Left to Justified alignment

Lesson 3: Referencing a Word document

a) Learning objective

Create and insert footnotes and endnotes

b) Teaching resources

Computers, projector, soft documents, text books, and the internet

c) Prerequisites

In Ordinary level ICT, student learnt how to insert page number as they read book they always seen the header, footer even if they not yet know how to call them. This, will facilitate them to acquire new knowledge of describing inserting header, footer, footnote, endnote, based on that past experience

d) Learning activity 2.3

● **Guidance**

- Teacher introduces new lesson by asking students to brainstorm in pairs the meaning the following term: footnote, endnote, header, footer.
- Teacher asks students to take hard book and look on the top and the bottom of page and tell him/ her what they see. Which is header and footer. From there ask them to state common things find in header and footer like date, authors, chapter, unit title, etc.
- Teacher guides students to follow the steps of inserting header, footer, endnote, foot note and converting footnote into endnote.
- **Answers to activity 2.3**

1&2&3) For answers to question 1, 2 and 3 consult the Student book in the section on Header and Footer

e) Application activities 2.3

1. Difference between footnotes and endnotes is that footnotes appear at the bottom of the same page, while endnotes appear at the end of the paper.
2. Students open file created in activity 2.3 and create 5 endnote on their choice in that document
3. Here the students convert the above created endnote to footnote.

Lesson 4: Creating and updating a table of contents

a) Learning objectives

Create and update a table of content

b) Teaching resources

In teaching and learning this lesson, computers, projector, soft documents, text books, and the internet for research are needed for effective learning.

c) Prerequisites

Students learnt in ordinary level Microsoft words window environment and have prior knowledge about **Heading** on home tab. And while reading books they often looking in table of content of given book. So constructing new knowledge, skills, will be based on that past experience.

d) Learning activity 2.4

● Guidance

- Teacher asks and guides students to brainstorm the advantages of creating table of content in pairs
- For managing time, teacher tells students to copy a text of 3 pages from the softcopy book available on REB website.
- Using projector, teacher demonstrate step by step the process of creating table of content. And on their computers, students follow all the steps shown by teacher then create table of content
- After creating table of content, teacher demonstrate how to update created table of content then the students practice the process on their computers

● Answers to activity 2.4

Students copy a text of 3 page which describe computer hardware and software save it as “*information, communication technology*” from softcopy books available on REB website. The process of applying all asked things on this activity is shown in students book on both two sections font and creating table of content.

e) Answer to Application activity 2.4

1&2) Students create headings as instructed in the question

Lesson 5: Page layout tab command

a) Learning objective

Make page set up by putting margin, page orientation and column

b) Teaching resources

Instructional materials needed for this lesson are Computers, projector, soft documents, text books, and the internet for more research.

c) Prerequisites

Students have basic skills in Word got from Ordinary Level in ICT subject

d) Learning activity 2.5

● **Guidance**

- To start this lesson teacher tells learners to click **on layout tab** and discuss on the use of the page setup items.
- Using projector, teacher model the steps of setting marge and guide learners to apply this process in their computers
- Students apply the process of page orientation guided by teacher’s demonstration
- Using required steps students create predefined column and user defined column helped by teacher

● **Answer to activity 2.5**

1&2&3) For answers to question 1, 2 and 3 consult the Student book in the section **on page setup**

e) Application activity 2.5

To answer this application activity, the student writes a document which describe their school environment then split the paragraph into 2 columns. For making the page Landscape follow the steps in students ‘book.

Lesson 6: Protecting a document from unauthorized access and changes

a) Learning objective

Practice the way of protecting documents from unauthorized changes and authorize reviewer to insert comment and tracked changes only

b) Teaching resources

Instructional materials needed for this lesson are Computers, projector, soft documents, text books, and the internet for more research.

c) Prerequisites

Students are familiar with word as they learnt it in Ordinary Level ICT

d) Learning activity 2.6

● **Guidance**

- Teacher asks students to discuss the benefits of protecting a document in small groups
- Teacher demonstrates the steps of protecting a document from unauthorized users and then the students practice the process on their computers
- Guided by teacher; students do practice on how to unlock protected documents
- Individually students practice on how to set permission on making change to restricted document.
- **Answers to activity 2.6**

The process of protecting a document with password is in student book on section Protecting Word files with a password

e) Answer to application activity 2.6

Answer

1. Open a document which describes the benefits of learning in your option that you protected and remove password. The steps are available in the Students Book on section of unlock protected document.
2. After typing a text related their career, students apply the steps of Protect it and mark the parts that can be changed

2.6. Summary of the unit

Advanced Word Processing enables learners to acquire skills in referencing a word document where Header and footer, Creating and inserting footnotes and endnotes, converting footnotes to endnotes, Creating and updating a table of contents are given much emphasis. Learners also study Page layout tab command which include Page set up group, Margin, Orientation and Column.

Students have acquired skills to secure a word document by protecting it from unauthorized changes, setting a password to open and modify a document, restricting formatting and editing of a document, allowing editing in a protected document, authorizing reviewers to insert comments and track changes only, authorize reviewers to insert comments only and removing document protection

2.7. Additional Information for teachers

How to Cross Reference Footnotes and Endnotes?

If you want to use the same footnote or endnote more than once throughout the text, there's an easy way to do it without having to insert the same thing over and over again.

Step 1: Place your insertion point where the reference is inserted in the text. On the **References tab**, click the **“Cross-Reference”** button.

Step2: In the Cross-Reference window, choose either “Footnote” or “Endnote” from the “Reference Type” dropdown menu.

Step 3: Next, click the **“Insert Reference To”** dropdown menu.

Word lets you create hyperlinks between cross-references so you can easily find the same footnote everywhere it appears in the document.

2.8. End unit assessment

(Answers)

1. The answer of both concept formatting and paragraph are in student's book in section of formatting a document
2. To answer this question, students have to type a document (one page) about XO laptop hardware apply all asked font, insert given footer, and header and protect created document with a password

2.9. Additional activities

2.9.1. Remedial activities

Write a paragraph of at least 4 lines and do the following:

1. First line: Arial 16, bold 3
2. Second line: 14, bold, underlined 4.
3. Bullets: right aligned

2.9.2. Consolidation activities

1. Write a text on any topic of ICT and do the following
 - a. Change the Header "your name at the top left of the top margin"
 - b. Change the Footer: "I am enjoying the ICT class "
 - c. Change your left and right margins to 1.5", double space, Centre the page when finished.
2. Write a text on why to make a budget and format it accordingly to make it look more beautiful. This text should have at least 5 lines.

2.9.3. Extended activities

Make a text on the use of money that you are going to get from the internet and do the following:

1. Create a space at the top of the document and type the heading "Make budget plan", font size 20 points, italicized, bold, centered, and underlined.
2. Change the line spacing of the second paragraph to 1.5 spacing.
3. Split text into 2 columns

UNIT 3. ADVANCED SPREADSHEET I

3.1. Key unit competence:

Apply conditional formatting and filtering and integrate spreadsheet to other applications

3.2. Prerequisite

Students have learnt Microsoft Excel in Ordinary Level, Mathematics (Statistics) which will facilitate them to learn some skills related to advanced spreadsheet.

3.3. Cross-cutting issues to be addressed:

- **Financial Education:** Is covered when students working on sales data in conditional formatting, through interpreting chart created in spreadsheet.
- **Gender education:** Students must be aware that both girls and boys must be involved equally in all teaching and learning activities. Programming is appropriate for both sex not for boys.

3.4. Guidance on introductory activity

- Learners open Spreadsheet software available in the school computer. They create a Spreadsheet file and save it as “*Burera Ltd Sales data*” into ICT work folder at the desktop.
- After saving the file, learners enter data into Spreadsheet software. *Burera Ltd sales data* describe sales of 6 months in Burera Ltd. This file is going to be used throughout this unit.

3.5. List of lessons

#	Lesson title	Learning objectives	Number of periods
1	Conditional formatting	Apply conditional formatting to cells	3
2	Charts	<ul style="list-style-type: none">• Create, and format charts, labels and axes• Interpret a chart data	3
3	Data organization (sorting, filter)	Use sorting and filtering technique in worksheet	3
4	Worksheet view and freezing panes		3

5	Integrating with other applications	Export excel data to other applications	2
6	End unit Assessment		2

Lesson 1: Conditional Formatting

a) Learning objective:

Apply conditional formatting to cells

b) Teaching resources:

The required materials are Computers, Projector and Excel applications

c) Prerequisites

As students learnt some topics in Microsoft excel such as cell formatting, inserting formula in ordinary level, logic in mathematics, they have prior knowledge which facilitate them to learn conditional formatting in spreadsheet.

d) Learning Activity 4.1

● Guidance

- Teacher introduces the lesson by guiding students to brainstorm the meaning of conditional formatting and asking them the necessity of applying conditional formatting on given data in small group. Then teacher add explanation on student's findings.
- Using projector, the teacher demonstrates the steps of highlighting cell rules and students themselves do that practice on their computer using inserted data in activity 4.1
- Students apply the steps of clearing rules and discuss reason of clearing cell rules.
- Teacher guide learners the benefit of creating top/bottom rules and follow the steps of creating top/bottom rules
- Teacher present available options of creating a formula based conditional formatting and choose one or two options to follow their steps together with student on their computers.

● Answers to activity 4.1

1&2&3) For answers to question 1, 2 and 3 consult the Student book in the section on **conditional formatting**

e) Application activity 4.1

1&2&3) Students use conditional formatting to highlight certain cells which meet the criteria shown in the question 1, 2 and 3

Lesson 2: Charts

a) Learning objective

- Create, and format charts, labels and axes
- Interpret a chart data

b) Teaching resources:

Needed materials to conduct this lesson: Computers, Projector and Excel applications, students book

c) Prerequisites

In mathematics, especially I statistics lesson, students learnt how to create different types of charts and interprets them which facilitate them to make graph here in advanced spreadsheet.

d) Learning Activity 4.2

● **Guidance**

- Students open the spreadsheet software and enter data in the table below and save the file as “Cereal Production”
- With the help of the teacher, students in pairs are going to use them to create a Chart

● **Answers to activity 4.2**

1&2) Students enter the given data and create a graph looking like the one given in the student book by using the steps given in the student book

e) Application activity 4.2

1&2) Students create charts as instructed in the questions and by using the steps shown in the student book.

Lesson 3: Data organization

a) Learning objectives:

Use sorting and filtering techniques in worksheet

b) Teaching resources:

For effectively facilitating this lesson, the needed instructional materials are: Computers, projector and Excel applications, student book, internet connection for more research.

c) Prerequisites

Students learnt in early age how to sort number, or object in ascending and descending order so this will facilitate them to learn data filtering and sorting data easily

d) Learning Activity 4.3

● **Guidance**

- Guided by teacher, Students open Burera Ltd Sales data using spreadsheet software. Students update the worksheet by adding a new column “Region”.
- Using updated Burera Ltd Sales file, students start to do the activity 4.3 and apply there the process of filtering and sorting data

● **Answers activity 4.3**

1)a&b) For answers to this question, consult the Student book in the section on data organization

e) **Application activities 4.3**

1)a&b) Students open Burera Ltd Sales data using spreadsheet software. Students update the worksheet by adding a new column “Product” and answer other questions accordingly.

Lesson 4: Integrating with other applications

a) **Learning objective:**

Export excel data to other applications

b) **Teaching resources:**

Computers, Projector and Excel applications, students’ book

c) **Prerequisites**

Students know that sometimes it may be necessary to copy text from one program to another. Build on this to introduce the lesson

d) **Learning activity 4.4**

● **Guidance**

- Teacher asks students to brainstorm the importance to export excel files to PDF
- Students open Burera Ltd Sales data using spreadsheet software. Then teacher use that file demonstrate them how to export excel files to PDF, other file types and students do the same.

● **Answers to activity 4.4**

1) For answers to this question, consult the Student book in the section on Exporting Excel files to PDF or other file types

e) **Application activities**

1. Students export Burera Ltd Sales Data File to web page file format y using the steps described in the student book
2. For this question students will apply the process of exporting the above file to PDF and discuss the benefit of saving excel worksheet tom PDF

3.6. Summary of the unit

In this Unit: Advanced Spreadsheet, learners got advanced skills in Conditional Formatting by applying highlight cell rule, top/bottom rule, and a new rule to selected data. It includes also Charts and Data organization where students learnt various techniques of sorting and filtering. Finally, learners integrated spreadsheet files with other applications. The integration is done by exporting data from Excel to another file type such as pdf, Web page, Xps and etc.

3.7. Additional Information

How to filter with a search

Excel allows you to **search** for data that contains an exact phrase, number, date, and more. This can be done in this way:

Step 1: Select the **Data** tab, and then click the **Filter** command. A **drop-down arrow** will appear in the header cell for each column.

Note: If you've already added filters to your worksheet, you can skip this step.

Step 2: Click the **drop-down arrow** for the column you want to filter.

Step 3: The **Filter menu** will appear. Enter a **search term** into the **search box**. Search results will appear automatically below the **Text Filters** field as you type. Click OK when done

3.8. End unit assessment

Referring to the table below:

2	Names	Math			Physics			Computer			General			Entrepreneu			
3		TJ	Ex	Total	TJ	Ex	Total	TJ	Ex	Total	TJ	Ex	Total	TJ	Ex	Total	Grand Total
4	Munezero	4	3	7	6	6	12	2	5	7	6	10	16	9	7	16	
5	Umutesi	3	5	8	9	8	17	5	6	11	2	3	5	6	8	14	
6	Rurangwa	6	3	9	7	3	10	9	4	13	3	6	9	8	8	16	
7	Ishimwe	8	7	15	5	5	10	6	6	12	5	5	10	8	9	17	
8	Mugisha	1	6	7	8	9	17	2	7	9	6	6	12	3	5	8	
9	Keza	2	4	6	7	6	13	6	6	12	3	4	7	8	6	14	
10	Iradukunda	6	4	10	6	2	8	4	8	12	9	5	14	5	6	11	
11	Rugira	3	5	8	2	2	4	8	8	16	7	9	16	6	7	13	
12	Ingabire	6	6	12	3	7	10	7	5	12	7	8	15	5	5	10	
13	Kalisa	6	4	10	7	4	11	7	5	12	3	6	9	5	6	11	
14	Rugamba	5	3	8	6	4	10	2	3	5	8	7	15	7	7	14	
15	Mukamana	9	7	16	6	5	11	7	3	10	6	4	10	3	7	10	
16	Mwiza	3	8	11	4	6	10	4	5	9	5	6	11	7	5	12	
17	Sugira	8	9	17	2	3	5	8	8	16	4	5	9	4	5	9	

1. Calculate total for each subject
2. Calculate the grand total
3. Highlight in red and bold students who scored less than 5 points in each subject

4. Use Green fill and with dark green text to highlight students who have total above 12 in any subject
5. Using blue highlight show all students who score 55 and above
6. Sort Grand Total in descending order

3.9. Additional activities

3.9.1 Remedial activities

Consider the table below:

SN	Items	Unit Price (Frw)	Qty(Kgs)	Total cost	Tax (10)
1	Bananas	200	240		
2	Beans	350	400		
3	Potatoes	150	300		
4	Rice	700	200		
5	Sugar	800	350		
Grand Total					

1. Calculate the total cost and the tax
2. Make the Pie chart of items and unit price
3. Show data label and Give the chart title

3.9.2. Consolidation activities

Considering the table below:

Name	50	50	100	50	50	100	50	50	100	50	50	100		
	Math			English			Physics			Computer				
Name	Test	Exam	Total	Test	Exam	Total	Test	Exam	Total	Test	Exam	Total	GT	Average
Yves	13	20		25	18		32	28		21	16			
Bates	2	23		48	13		34	27		10	18			
Hirw	21	34		35	28		36	23		22	29			
Cyez	5	26		25	16		37	30		10	22			
Cyiza	25	28		28	24		33	31		15	21			
Uwer	43	38		43	26		47	44		31	44			

- i. Calculate total for each subject
- ii. Calculate the Grand Total and Average
- iii. Highlight in red and bold students who scored less than 5 points in each subject

- iv. Use Green fill and with dark green text to Highlight students who have total above 15 in any subject
- v. Using blue highlight show all students who score above the average
- vi. Create a bar column

3.9.3. Extended activities

Considering the table below:

	Name	Chemistry	English	Math	Total	Averag	Maxim	Minimu
1	KANEZA	45	90	64				
2	RUKUNDO	80	76	44				
3	KEZA	88	89	79				
4	HIRWA	76	56	95				
5	SHEMA	45	77	65				
6	ISIMBI	56	36	33				
7	SUGIRA	60	95	69				
	AVERAGE							
	MINIMUM							
	MAXIMUM							

- i) Display in red color the Total Points of KANEZA in 3 subjects.
- ii) Display in blue color the Average Points of RUKUNDO in 3 subjects.
- iii) Highlight Maximum Points of all these Students in these 3 Subjects?
- iv) What is the Minimum Points of all these Students in these 3 Subjects?
- v) Did ISIMBI and SUGIRA fail or pass?
- vi) If they Failed or Passed, Display the Formula.
- vii) Display the Average point of all Students in Chemistry only.
- viii) Display the Minimum and Maximum points of all Students in English and Math.
- ix) Sort Students Names in Ascending Order.
- x) Which Steps we follow to create a Chart of the whole table.

UNIT 4: SEARCHING THE INTERNET

4.1 key unit competence

Use ethically the internet in doing researches

4.2. Prerequisites

Students are familiar with the internet as they learned related concepts in Ordinary level and use it for research in everyday lesson activities

4.3. Cross-cutting issues to be addressed

- **Inclusive Education:** students with and without disabilities participate and learn together in the same classes.
- **Peace and Values Education:** students must be aware of internet-based crimes like hacking and prevent accessing people's data without permission
- **Financial Education:** to be covered when explaining students cost related to anti spyware and firewall used in the web security
- **Standardization culture:** To be covered through the rationalization of internet ethics relating to the increasing technology of computing device and to avoid actions that are against Rwandan culture such as pornography, hacking ...

4.4. Guidance on introductory activity

- The teacher makes students observe the image and describe what they see
- Students brainstorm the importance of such a room and the materials needed to create one
- Guide students to list all possible elements that make this communication possible
- Teacher guides students to identify devices and transmission medium used to facilitate sending and reception of the email
- Teacher let students express themselves about the use of emails. Remember the goals/objective is to introduce students to the concept of internet ethics. Therefore, do not spend much time on email.

4.5. List of lessons

#	Lesson title	Learning objectives	Number of periods
1	Internet ethics	Show interest in using internet appropriately by respecting all the related ethic principles	2
2	Web security: spyware, hacking, firewall	Describe various web security mechanism and tools	1
3	URL and its parts: Protocol, host name, domain name, sub domain	Identify and explain components of URL	2
4	Search on the internet: Simple search techniques (keyword searching)	Explain the internet search strategies for better search results	3
5	Search on the internet: Advanced search techniques (Boolean operators, quotation marks, tilde sign...)	Apply internet search techniques so as to get better search results	3
6	Search on the internet: Searching for documents, books, images, video on the internet	Apply acquired knowledge to request for a service online	3
7	Search on the internet: Searching by image	Apply acquired knowledge and skills to request for information online	3
8	Browser's Techniques for remembering: Cookies, Bookmark, Cache and Browser history	Apply different mechanism of revisiting a website easily. Understand strategies used to make the internet remember its users	2
9	End Unit assessment		2

Lesson 1: Internet ethics

a) Learning objectives

Show interest in using internet appropriately by respecting all the related ethic principles

b) Teaching resources

Computers with internet connectivity and internet browsers, Projector, books

c) Prerequisites

Students have learnt some concepts of computer internet in Ordinary level. They ideally have some knowledge and skills related to computer network and data communication.

d) Learning activities

● **Guidance**

- Teacher guide students by forming small group of at least five students per group
- Teacher guide student to think about the scenario in the activity 4.1
- Teacher walks around to see if everyone is participating actively
- The teacher can use this exercise to make students aware that in today's world people pretend to be who they are not and may trick someone using the internet
- Groups present their ideas on the given scenario and present other behaviors that are against internet ethics

● **Answers to Activity 4.1**

The activity 4.1 requires student to use their brain storming as there is no specific answer

e) Answers to application activity 4.1

The application activity 4.1 requires student to appreciate the impact of ICT and internet on ethics, privacy and intellectual property. Let the students explore various policy that safeguard or regulate effects of internet on these issues

Lesson 2: Web security: spyware, hacking, firewall

a) Learning objective

Describe various web security mechanism and tools

b) Teaching resources

Computer lab, Internet and textbooks to facilitate research

c) Prerequisites

Students and teacher are aware with computer security; they also have knowledge about internet ethics issues learnt from previous lesson.

d) Learning activities

● **Guidance**

The activity 4.2 in student book is used to introduce the lesson. Students visit the school computer lab and observe how computers are arranged and protected. The teacher asks students to take notes of what they observed and to reply the questions in the activity. By using technical explanations teacher helps students to understand the importance of computer security.

Teacher organizes students in pairs in order to do activity.

- Teacher asks students to form small groups to do the learning activity 4.2 and to state other ideas related to Web security spyware, hacking, firewall
- Teacher walks around and sees if students are doing the given activity
- Teacher lets students present their answer to the rest of class.
- Teacher lets Students react on the finding/ answers from other groups.
- From the presentations and additions by the teacher, a summary on Web security spyware, hacking, firewall is done

● **Answers to Activity 4.2**

- In the computer lab, some computers are secured with password other are not. Depending on students' reaction some measures that can be taken are the following: installing anti-virus in all computers, Protect all computers with password, etc.
- The second question require students to reflect about the malpractices done on internet such as stealing the identity of customer bank and get the money without permission, stealing information(hacking) using internet, different online harmful services such as human trafficking, etc.

e) **Answers to application activity 4.2**

1. Importance of web security is summarized here below:

- Web security helps to keep safely data and equipment functioning and provide access only to appropriate people.
- Web security is important as it helps keep information protected. Helping to prevent uploading or downloading malware and helping programs run more smoothly.
- Web security is important for preventing theft of data, software, services and equipment

a. The type of security used here is authentication

b. It is important because authentication grant someone permission to do or have something.

- The activity requires students to use internet to search about the five categories of firewall. The five types of firewalls are these: Packet filtering firewall, circuit-level gateway, stateful inspection firewall, Application-level gateway, Next-generation firewall. Students describe them extensively.

Lesson 3: URL and its parts (Protocol, host name, domain name, sub domain)

a) **Learning objective**

Identify and explain components of URL

b) **Teaching resources**

The successful implementation of this lesson requires students and teacher the need of regular materials such as Computers with internet connectivity and internet browsers, Projector. There will also be a need for a student book books.

c) Prerequisites

Students have basic knowledge about the use of internet acquired in ordinal level senior one and senior three.

d) Learning activities

● **Guidance**

- Teacher organizes students into groups in order to do the activity. 4.3. They identify the different parts that the REB website name
- Students in groups, discuss probable ways used to get their result from REB's website
- Teacher walks around and sees if each student is participating in group activity.
- Teacher lets students share their answers in presentation.
- Teacher lets students react on the findings from their colleagues
- Teacher gives the instructions on how to write the REB's web address into address bar of any browser

● **Answers to Activity 4.3**

The first activity require student to discuss in groups the steps that each one have used in order to obtain his or her result. Thereafter they share their findings and these findings lead them to conclude about the asked question 2&3) Explanations on these terms are in the student book

e) Answers to application activity 4.3

1&2&3) For answers to question 1, 2 and 3 consult the Student book in the section on URL and its parts

**Lesson 4: Search on the internet: Simple search techniques
(keyword searching)**

a) Learning objectives

Apply different simple search techniques to search information on internet

b) Prerequisites

Students have basic skills and knowledge about the use of internet. They also have knowledge about internet ethics learnt in previous lesson

c) Teaching resources

Computer lab with internet connectivity and different internet browsers, Projector, books are needed.

d) Learning activities

● **Guidance**

- This lesson has to be conducted inside computer lab where teacher guide student to start their computer. These computers have to be connected to the internet.
- Teacher guide student to open any browser.
- Teacher help each student to type the search engine in URL of opened browser by doing a demonstration using a projector
- For each strategy to get better search results the teacher does a demonstration using a projector and students discuss the accuracy of the results got
- Students enters search terms in their browsers following the teacher's demonstration

● **Answers to Activity 4.4**

- The parts labeled from A to G **A:** Title Bar **B:** Address bar **C:** Menu Bar **D:** Control button **E:** Search query **F:** Search Text Box **G:** Search Button
- The second activity require students to make peer group and discuss the impact of ICT in Rwandan school and thereafter open the computer internet to search about the related question

e) **Answers to application activity 4.4**

This practical activity requires students to conduct research by typing the search keywords (impact of *gira inka munyarwanda*, *rwandan prime ministers*) in search box of used search engine. The search engine to use is Google.

For question 2 better use the website: minaloc.gov.rw "prime ministers"

Lesson 5: Advanced search techniques

(Boolean operators, quotation marks, tilde sign...)

a) Learning objectives

Explain the internet search strategies for better search results

b) Prerequisites

Students have basic skills and knowledge about the use of internet they also have knowledge about internet ethics learnt in pervious lesson

c) Teaching resources

This lesson requires regular material such as Computer lab with internet connectivity and different internet browsers to carry out more practice and doing research. Teacher will need a projector for displaying information to the student without walking around each student. Student book and teacher guide will be additional tools.

d) Learning activities

● **Guidance**

- The guidance of this learning is the same as the one for the previous lesson except addition instruction from the teacher to include advanced searching techniques seen in student book.
- Using computers connected to the internet students to open any browser.
- The teacher demonstrates search techniques one after another. For each search technique a demonstration is done, students interpret the results and do the same using their computers

● **Answers to Activity 4.5**

Students conduct researches using different techniques which are Boolean operators, quotation marks, tilde sign...

e) Application activity

Answers to application activity 4.5

- Students conduct search in each previous learnt subject activity using different advanced search techniques seen in student book
- Students discuss the use of NEAR keyword and use it in searches

Lesson 6: Searching for documents, books, images, video on the internet

a) Learning objectives

Apply acquired knowledge to request for a service online

b) Prerequisites

Students and teacher are familiar with the use of internet and they have basic skills about searching on internet learnt from previous lessons

c) Teaching resources

Material such as Computer lab with internet connectivity and different internet browsers to carry out more practice and doing research, Projector for displaying guideline.

d) Learning activities

● **Guidance**

- Students brainstorm on which kind of resources found on the internet (documents, books, images, video) and give examples of websites that have got those resources
- For each kind of search, students give ideas on how it is done, the teacher demonstrate using a projector the results given by the students' ideas
- The teachers improve the student's ideas and demonstrate the search techniques he/she wants to convey
- Students discuss the accuracy of the results got and apply the same techniques by searching using their computers

● **Answers to Activity 4.6**

Student use different techniques and search for the video related to the asked question in student book, some students will have to display the video using projector.

e) Answers to application activity 4.6

Students search for grain germination videos, Imigani Miremire book/text, current map of Rwanda. They discuss the results got in terms of accuracy.

Lesson 7: Searching by image

a) Learning objective

Apply acquired knowledge and skills to request for information online using image

b) Teaching resources

The use of regular material such as computer with internet connection, different web browsers add-on software, projectors together with student book.

c) Prerequisites

Students have basic skills about searching on internet using different techniques acquired from previous lessons

d) Learning activities

●Guidance

This lesson has to be taught in computer lab through this activity:

- Teacher send downloaded image to every student using email or any removable device.
- Teacher asks students to copy the shared image
- Teacher guide student by showing them the area where to paste the copied image
- Teacher asks students to observe carefully the search engine result and describe their observation

●Answers to Activity 4.7

The practical activity requires students to conduct the research for the content and other related image using the shared image

e) Answers to application activity 4.7

Students download ICT books using learned techniques

Lesson 8: Browser's techniques for remembering:

Cookies, Bookmark, Cache and Browser history

a) Learning objectives

Apply different mechanism of revisiting a website easily and understand strategies used to make the internet remember its users

b) Teaching resources

Computers with internet connectivity and internet browsers, Projector and the student book.

c) Prerequisites

Student and teacher are familiar with the use of internet such as using email or other social media like face book

d) Learning activities

●Guidance

- The lesson starts with the interpretation of the image in the activity 4.8. This is compared to the cookie technique used by browsers
- For each technique the teacher displays a demonstration using a projector and an interpretation of the technique is done

●Answers to activity 4.8

1. Referring to the cord found in the bible students will brainstorm on its role
2. There are some special programs used by the browser that helps to store username but they do not save password for security purpose

e) Answers to application activity 4.8

1. The purpose of Bookmark, cookies Cache and Browser history have been discussed in student book
2. The activity requires students to use internet to search for different way the user can view bookmarks using different browsers.

4.6. Summary of the unit

Internet ethics means acceptable behavior of using internet, throughout this lesson some ethics have been discussed together with internet issues that can arise while using internet in improper way.

The unit covers the information about web security together with how to prevent unauthorized access by using different techniques such as using firewall. The web address also known as URL with its part has been discussed. Least but not last, this unit covered also the searching on internet using simple search techniques together with advanced search techniques (Boolean operators, quotation marks, tilde sign...), the unit covered the process of searching for documents, books, images, video on the internet lastly browser's techniques for remembering have been pointed on.

4.7. Additional information for teachers

Internet ethic refers to acceptable behavior of using internet, there are some commandments that have to be respected while using internet. Web security have to be applied in order to avoid network attach by hackers for example

The access to internet requires the use of web browsers such as Chrome, Firefox, Internet Explorer, Opera, Safari etc; the search of the document, image or videos online using search engine require different techniques

Once the searched item from internet need to be reused it is advisable to clarify the source in order to avoid plagiarism.

4.8 End Unit assessment (answers)

1. a) URL stands for Uniform Resource Locator
b) Parts of URL are: Protocol, Domain, sub domain, Top Level Domain and Path for more explanation refers to student book
2. The https:// stands for Hypertext Transfer Protocol Secure; it is the protocol that govern how data is transmitted over a network
3. This is practical activity requires students to open any browser and try to open many windows regarding to the provided site and try to navigate them.
4. The term **web browsing history** refers to a list of web pages a user has visited recently and associated data such as page title and time of visit which is recorded by web browser software as standard for a certain period of time. Web browsers software do this in order to provide the user with a back button and a history list to go back to pages they have visited previously as well as displaying visited links
5. Search Engines refer to programs that help a user to look for and identify items that corresponds to keywords or phrases specified from the World Wide Web. Examples include; Yahoo, Google, Bing and Ask.com among others.
6. This activity requires the student practically perform video search procedure by following the steps provided in the student book
7. This activity requires the student to open any browser and enter the web address into the address bar and observe careful on the opened web page the information regarding to the applying for ID

4.9 Additional activities

1. Discuss about ethical challenges arising from the use of computers and other electronic devices such as phone, tablet, iPad, ...
2. Referring to web security differentiate the term authentication from authorization

4.9.1. Remedial activities

1. On World Wide Web apart from the Google search engine, conduct research about other ten top search engines that are commonly used
2. Explain the difference between a spyware and a spam. Identify risks that can arise when your computer is infected with spyware.

4.9.2. Consolidation activities

1. Respond by true or False
 - a. Ethical issues are defined by laws and societal standards.
 - b. Handheld electronic multimedia computer devices enable communication on the go, any time, and any place.
 - c. Intranets use firewalls to protect computer systems from outside intruders.

- d. Privacy laws prohibit conducting research surveys on the internet.
- e. Groupware can make it possible for group members to access one another's schedules.
- f. A telecommuter works regularly from a location away from the company work site.
- g. Videoconferencing is a viable alternative to face-to-face meetings.
- h. Synchronous collaborative writing is interactive.
- i. If you talk on the cell phone in public, you should talk loud enough that people around you can hear effortlessly.
- j. E-mail and cell phone records are confidential and when erased cannot be retrieved.

4.9.3. Extended activities

1. Search on internet can be carried out in different way; is there any difference between search image and search by image o internet? If yes explain.
2. a) Define the term software add-ons
b) Research on internet about how to download and install add-ons within any browser.

UNIT 5: ONLINE GOOGLE APPLICATIONS

5.1. Key Unit competence

To be able to use google application tools to adapt in daily life technology

5.2. Prerequisites

Students have learnt some concepts of computer hardware and software in Ordinary level. They ideally have some knowledge and skills related Microsoft product like Ms office, Ms excel, Ms PowerPoint, Advanced Spreadsheet and internet. This concept will help students to be familiar with online google Application tools.

5.3. Cross-cutting issues to be addressed

Throughout every lesson, cross cutting issues must be addressed. Addressing cross cutting issues makes a lesson not to be an isolated entity but relate the lesson with the issues in real world. Here below are some cross-cutting issues to be addressed:

- **Inclusive Education:** Students with and without disabilities participate together in the same classes during teaching and learning process.
- **Standardization Culture:** to be covered when explaining the standards required during installation of system software and application software and factors that need to be considered in order to minimize health risks such as RSI (Repetitive Strain Injuries) and eye strain while using computer. Students must be familiar with the standards of computer hardware devices and software by making sure that they always have to use devices and software from known manufactures
- **Gender education:** All students must get involved in class activities regardless of gender

5.4. Guidance on introductory activity

- In the classroom the student introduces the unit by bringing up the scenario in the introductory Activity of unit five
- Students give answers questions from Q1. to Q6. Note that answers are rapidly given, no need for advanced details

Direct Answers:

1. The ICT Teacher will use some online applications that will help him to share lessons and assessment already prepared and give his presentation to the students online.
2. By using cloud or online Drive storage, the teacher will store his lessons/ assessment so that he can share to the students and with other teachers at school.
3. By using online assessment application or google forms/ or google classroom, the teacher will give a test to the students and while is not around at school.
4. The difference in desktop and web applications is explained as:
5. Desktop application is a computer program that runs locally on a computer device like a desktop or a laptop whereas a web application needs an internet connection or some sort of network to work properly.
6. Some Examples of online applications include webmail, word processors, spreadsheets Yahoo and Google Apps.
7. Online Google Applications? (Refer to the student books unit 5.0)

Using a laptop whose content is projected for every student to see, teacher open different online Google applications and describe what one can achieve/do with them.

NOTE: The introductory activity must be done quickly in order to make sure it does not take too much time that would be used for lessons. One option can be to give it as a homework to learners who will then come to the class having an idea on the new lesson

5.5. List of lessons

#	Lesson title	Learning objectives	Periods
1	Google Account / Gmail	Create a google account and e-mail account	3
2	Google Drive	Store and access files online, syncs stored documents, photos and more across all of the user's devices.	2
3	Google Docs	Create and edit text documents right on web browser so that multiple people can work at the same time in the same documents.	3
4	Google sheets	Create and edit a spreadsheet on web browser so that multiple people can work at the same time in the same documents.	3

5	Google slides	Create and edit a presentation on web browser so that multiple people can work at the same time in the same documents.	3
6	Google form	Create an online questionnaire, forms, surveys, and quizzes as well as to collaboratively edit and share the forms with other people or to collect information from a group of people.	3
7	Google classroom	Provides a central location to communicate with students, ask questions, and make assignments.	3
8	Google Calendar	Create a quickly schedule meetings and events and get reminders about upcoming activities	3
9	YouTube	Create a YouTube channel for video sharing service where users can watch, like, share, comment and upload their own videos.	3
	End Unit assessment		1

Lesson 1: Google Account

a) Learning objectives

Introduction, role of google mail, starting google mail account

b) Teaching resources:

Devices like computers, projector, and internet are needed to conduct the lesson in an effective manner.

c) Prerequisites:

Students have basic knowledge and skills about internet, they should also be familiar with some internal components that they find in phones and other electronic devices.

d) Learning activities

● Guidance

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

● Answers to Activity 5.1

1. Teacher will submit the prepared assessment to the school at trough E-mail.
2. Teacher will receive the answers of students after their submission through email.

3. e-mail is a message sent from one computer to another over the Internet, using a set webmail server address.
Some example of popular e-mail provider: Gmail, Yahoo mail, Microsoft outlook,
4. Refer to student book unit 5.1

e) Answers to application activity 5.1

1. Refer to student books the step of creating Gmail account unit 5.1
2. It offers users 15 GB of free storage space.
3. Refer to student book Role of Google account / Gmail address unit 5.1.1
4. By creating google account you can automatically access all Google Apps

Lesson 2: Google Drive

a) Learning objectives

Introduction, role of Google Drive, Getting started with Google Drive, Upload and sync file on google Drive

b) Teaching resources:

Devices like computers, projector, and internet are needed to conduct the lesson in an effective manner.

c) Prerequisites

Students are aware and familiar with the problems related to malfunction of electronic devices such as radio, computer and printer. They also have knowledge and skills on proper use of cleaning tools learnt in ordinary level

d) Learning activities

● **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

● **Answers to Activity 5.2**

- The activity in question one requires the student to identify the all mean can use to keep documents permanently using online drive.
- Once documents have kept using online drive, can be accessed anywhere at real time so that the used devices are connected.
- Drive or cloud storage can be explaining as web-based service that provides storage space on a remote server which are accessed over the Internet with client-side software, are useful for backing up files.

- Cloud storage has given users the ability to share and access files remotely. Using the cloud for storage gives you access to your files from anywhere that has an internet connection. When you are working with cloud storage, every time you make changes to a file it will be synced and updated across all of your devices that you access the cloud from.

e) Application activity

• **Answers to application activity 5.2**

- Google Drive is a cloud-based file storage and synchronization service developed by Google. It allows users to store files in the cloud, share files, and edit documents collaboratively.
- Yes, Cloud storage providers add additional layers of security to their services. Since there are many people with files stored on the cloud, these providers go to added lengths to make sure your files don't get accessed by someone who shouldn't. All of your files are stored on Google servers that are protected by physical security measures.
- Google Drive supports a wide range of file types, including common formats like .doc, .xls, .ppt, .pdf, Ect
- Files and Folders
- Google Drive
- Refer to student book unit 5
- Google Docs is a free, web-based word processing program offered by Google. Microsoft Word is a word processing program offered by Microsoft. Google Docs has fewer features than Microsoft Word, but it is easier to use and is available to anyone with a Google account.

Lesson 3: Google Docs

a) Learning objectives

Introduction, role of Google Doc, Google Doc working environment, Getting started with Google Doc

b) Teaching resources:

Devices like computers, projector, and internet are needed to conduct the lesson in an effective manner.

c) Prerequisites:

Students have knowledge about Microsoft Word from Microsoft office, web browser and internet.

d) Learning activities

● **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive

- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

● **Answers to Activity 5.3**

- After discussion of students, they will find that with some online drives, the shared document allows two or more people to edit the same document simultaneously.
- The Shared documents (or collaborative documents) that allow two or more people to edit the same document simultaneously will keep every change made by students and is saved automatically and teacher will receive and track the changes' owner automatically.
- With Office or Google doc it's easy to work with others, by sharing document working on including people who don't have Microsoft Office, you can send links to documents instead of sending file attachments, which they can reviewed and edited, (if you let them) and save change on the web browser. That saves on online drive storage and prevents you from having to reconcile multiple versions of the same document.

e) **Answers to application activity 5.3**

- Google Docs is a free, web-based office suite offered by Google. It includes a word processor and can be accessed online and edited in real-time by multiple users. the main features of Google Docs are real-time collaboration, version history, and commenting.
- Refer to student books on how to create a new doc and on how to rename it.
- To share a document on Google Docs, click on the "Share" button in the top right corner of the document. From there, you can add the email addresses of the people you want to share the document with. You can also choose whether you want them to be able to edit the document or just view it.
- Yes, it is possible to collaborate with multiple people simultaneously in real time using Google Docs.
- Yes, Google Docs integrates with other Google applications like Gmail. You can insert files from Google Drive into your Gmail messages, and you can also attach files from Google Drive to your Gmail messages.

Lesson 4: Google Sheet

a) Learning objectives

Introduction, role of Google Sheet, Google Sheet working environment, Getting started with Google Sheet

b) Teaching resources

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and internet connection.

c) Prerequisites

Students should have knowledge and skills related to Microsoft Excel, web browser and internet.

d) Learning activities

● Guidance

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

● Answers to Activity 1.4

- After discussion of students, they will find that to collect that information, they will use shared spreadsheet with some online drives, the shared spreadsheet will allow students to edit the same sheet simultaneously.
- Refer to student book unit 5.4.

e) Application activity

Answers to application activity 5.4

- 1) A Google spreadsheet is a cloud-based spreadsheet application that allows users to create and edit spreadsheets online. Google Spreadsheets offers all of the features of a traditional spreadsheet application, including support for formulas, charts, and pivot tables.
- 2) The best way to share data between multiple users while working on a single spreadsheet in Google Sheets is to use the “Share” function. This will allow you to invite other users to view and/or edit the spreadsheet.
- 3) How spreadsheet in Google Sheets use AutoSaved feature while there is a change made on it. This means that will automatically save the work.
- 4) Google sheets are different from Microsoft Excel documents in a few key ways. First, Google sheets are stored online, while Excel documents are stored locally. This means that Google sheets can be accessed from anywhere, and multiple people can work on them at the same time. Second, Google sheets have built-in collaboration features, such as the ability to leave comments on cells. Finally, Google sheets have a more limited feature set than Excel, but they are also easier to use and require no setup or installation.
- 5) Refer to the student books unit 5.4

Lesson 5: Google Slides

a) Learning objectives

Introduction, role of google slides tool,

Google slides working Environment, starting google slides, Getting started with Google Sheet, Using Google Slides

b) Teaching resources:

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and internet connection.

c) Prerequisites

Students should have knowledge and skills related to Microsoft Excel, web browser and internet.

d) Learning activities

● **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

● **Answers to Activity 5.5**

- 1) There is online presentation app that help to create and format presentations and work with other people through web-based applications supported on the web browsers. The Dos will share their presentation with student so that it can be accessed in order to let them add their ideas and comments.
- 2) Refer to Students unit 5.5

e) Application activity

Answers to application activity 5.5

This is a practical activity that

- 1) Google Slides is an online presentation app that lets you create and format presentations and work with other people. It can Create new presentations or edit existing ones, share presentations and collaborate in the same presentation at the same time, Work anywhere, anytime on presentations from your devices “computer, phone, tablet” with the Google Slides App. Advantages of using Google Slides: Easy to access, encourages teamwork, Compatible with other Google applications, Auto-saving, It is free, just need a Gmail account to start using Google Slides.
- 2) Refer step on creating presentation on student book Unit 5.4.4

Lesson 6: Google Form

a) Learning objectives

Introduction, role of google form, working environment of google form, Getting started with Google form.

b) Teaching resources:

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and internet connection.

c) Prerequisites

Students should have knowledge and skills related to Microsoft Excel, web browser and internet.

d) Learning activities

● **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class

● **Answers to Activity 5.6**

- 1) In group discussion, some students can say that data can be collected from field visit by visiting all school to get information other will say that the school will collect info and send them to him through E-mail for compilation but simple way to collect those information is to set an online google form with questions that request all information he need and the school will answer and submit.
- 2) By submission, the information submitted will received by Director of Education and google form will automatically produce different needed report.
- 3) For this question refer to the student book

e) Application activity

Answers to application activity 5.6

- 1) For this question refer to the student book
- 2) Short answer, Multiple choice, Checkboxes, Drop-down, Linear scale Tick Box grid.
- 3) Google form manage event registrations, create a quick opinion poll, and much more. With Google Forms, you can create and analyze surveys right in your mobile or web browser. You get instant results as they come in. And, you can summarize survey results at a glance with charts and graphs.
- 4) For this question refer to the student book on how form are created.

Lesson 7: Google Classroom

a) Learning objectives

Introduction, role of Google Classroom, working environment of Google Classroom, Getting started with Google Classroom.

b) Teaching resources:

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and internet connection.

c) Prerequisites

Students should have knowledge and skills related to Microsoft Excel, web browser and internet.

d) Learning activities

● **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- In group discussion, the students will discuss on how teacher can give online course with students from different areas and give their ideas.
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

Answers to Activity 5.7

- 1) In group discussion, the students will discuss on how teacher can give online course with students from different areas and give their ideas. Teacher will use online google classroom in order to conduct a lesson to all students.
- 2) For this question refer to the student book

e) Application activity

Answers to application activity 5.7

- Google Classroom is a suite of online tools that allows teachers to set assignments, have work submitted by students, to mark, and to return graded papers. It was created as a way to get eliminate paper in classes and to make digital learning possible. It was initially planned for use with laptops in schools, such as Chromebooks, in order to allow the teacher and students to more efficiently share information and assignments.
- Classwork
- Google Classroom uses Google Forms to prepare quizzes and assessments.

Lesson 8: Google Calendar

a) Learning objectives

Introduction, role of google calendar, Google calendar interface, getting started with Google Calendar.

b) Teaching resources:

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and internet connection.

c) Prerequisites

Students should have knowledge and skills related to Microsoft Excel, web browser and internet.

d) Learning activities

● **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- In group discussion, the students will discuss on how teacher can give online course with students from different areas and give their ideas.
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

● **Answers to Activity 5.8**

- In group discussion, the students will discuss on how teacher can give online course with students from different areas and give their ideas. And how notification, reminder, task and events will set in order to conduct a lesson to all students using online calendar.
- For this question refer to the student book

e) Answers to application activity 5.8

- With Google Calendar, you can quickly schedule meetings and events and get reminders about upcoming activities, so you always know what's next. Calendar is designed for teams, so it's easy to share your schedule with others and create multiple calendars that you and your team can use together.
- With Google Calendar, you can quickly schedule meetings and events and get reminders about upcoming activities, so you always know what's next. Calendar is designed for teams, so it's easy to share your schedule with others and create multiple calendars that you and your team can use together.
- Google account.
- Invite colleagues to events, Shared Calendars, Email notifications of events, "Public" setting for improved communication

Lesson 9: YouTube

a) Learning objectives

Introduction, role of YouTube, working environment of YouTube, getting started with YouTube.

b) Teaching resources:

The needed resources are computers as the lesson will be conducted in the computer, there is also a need for a projector for displaying examples to students and internet connection.

c) Prerequisites

Students should have knowledge and skills related to the internet, google drive on how documents uploaded, web browser and internet.

d) Learning activities

- **Guidance**

- This lesson can be conducted in the classroom or in computer lab for research purpose
- Teacher groups students into small groups so that they share ideas on the google drive
- Teacher walk around the group to guide the groups and to make sure every member is participating
- Each Group representative to present their finding to the rest of the class
- With the guidance of the teacher a summary on computer maintenance principles is done

- **Answers to Activity 5.9**

Teacher will help students on how they can get some course practical video content uploaded and shared from YouTube platform and how they can use YouTube to create their channels for education purposes.

e) Answers to application activity 5.9

1. a. Referring to the steps provided in the student book.
b. First you need to sign into YouTube using a Google Account. Once you're signed in, click 'Create Account', and choose whether it's for you or for your business. You can then create a YouTube channel on your account, upload videos, leave comments, and create Shorts and playlists.
2. Referring to the steps provided in the student book.
3. Improve the learning experience, support educational creators, expand support for learning partners.
4. Refer to student book

5.6. Summary of the unit

Google Apps is a collection of web-based programs and file storage that run in a web browser, without requiring users to buy or install software. Users can simply log in to the google account to access their files and the tools to manipulate them. The applications include communication tools, productivity tools, storage and Google Sites for example: Google Drive, Gmail, Google classroom, Google Calendar, Google Docs, Google sheet, Google slide, etc.) With Google Apps, sharing content is as simple as granting someone access, which facilitates collaboration, peer review of academic materials, and the collective generation of knowledge.

5.7. Additional information for teachers

There are other online Google Applications that are not mentioned in this unit but students need to know like Google Calendar, Google Talk, Google map, Google translate, google book, Google finance, etc.

The use of online Google Apps like Google search and internet is crucial because this enhance the quick lesson delivery and make students to be more attractive during the lesson delivering.

5.8. End Unit assessment

1. To get started with Google Drive, the end user must create or sign in to a Google account. Then, the user types "drive.google.com" into his or her browser. "My Drive" will automatically appear, which can contain uploaded or synced files and folders, as well as Google Sheets, Slides and Docs. Then, the user can either upload files from his or her computer or create files in Google Drive.
2. The best way to share files with others using Google Drive is to use the "Share" button. This button is located in the top-right corner of the screen, next to the "Create" button. When you click on the "Share" button, a pop-up window will appear where you can enter the email addresses of the people with whom you would like to share the file.
3. Regularly backing up your files, organizing your files in an easily accessible way, sharing files with others only when necessary, using security features like two-factor authentication.
4. Folders on Google Drive are used to store and organize files. You can create folders, share folders, and move files between folders.
5. The main advantage of using Google Sheets is that it is a cloud-based application. This means that users can access their sheets from anywhere and that the sheets are always backed up. Additionally, Google Sheets offers more collaboration features than Excel, making it easier for team members to work together on a project.
6. Yes, it is possible to collaborate with other while working on a single sheet. To do so, you will need to share the sheet with your other. Once the sheet is shared, it will be able to viewed and edited.

7. There are three types of permissions that can be provided in Google Sheets: view, comment, and edit. View permissions allow users to view the contents of a sheet, but not make any changes. Comment permissions allow users to view the contents of a sheet and add comments, but not make any changes. Edit permissions allow users to view the contents of a sheet and make changes.
8. A theme is a set of colors, text styles, backgrounds and other designed elements that give the presentation a look. On how it set refer to a student book.
9. To Create an assignment:
 - In the bottom right, click the drop-down arrow and choose “schedule.”
 - Select the date and time you want the assignment to post.
 - Click “schedule.”
10. You can give an assignment just to one particular student, or a group of students instead of the entire class. By default, an assignment is posted to all students in the class.
 - Click the drop-down arrow next to “All Students.”
 - Deselect “All Students”
 - Select just the student or group of students you wish to receive the assignment post.
11. You can add attachments, links to outside resources and websites, YouTube videos, or Google Drive files to your assignment. When the file attachment is a Google Docs, Sheet, or Slide, you gain additional options for distribution and how students interact with the file.
12. Click View responses on the assignment or the Student Work page to see all responses in Forms.
13. Add questions, headers & sections, open a form in Google Forms, Click Add. To the right of the question title, choose the type of question you want, Type the possible responses to your question. To prevent people from not answering, turn on Required.
14. There are many ways you can use Google calendar for work: set working hours in Google Calendar, get daily agenda emailed, share Google Calendar, add attachments to Google Calendar, Google Calendar Notifications, etc. Learning how to use Google Calendar can help you better manage your time, processes, and workload. Remembering birthdays to

scheduling international meetings, you'll find that it helps you improve your time management and scheduling better than other calendars on the market. Especially the paper kind. So, if you're looking to create a more efficient team or daily routine, Google Calendar can become your own little personal assistant.

15. Refer to the step on student book on how to create YouTube channel.

5.9. Additional activities

3. Open at least three different documents from different Microsoft application program and convert them to Google Apps.
4. What is meant by Google applications?
5. Is Google an application software? Where can I see my Google applications?
6. Discuss on the advantage and disadvantages of online google application.

5.9.1. Remedial activities

2. Discuss on the integrality of Google classroom and Google calendar
3. Discuss on the corroboration and similarity of google Apps
4. Differentiate Google Apps (slide, sheet, docs) from Microsoft office (PowerPoint, excel, word)

5.9.2. Consolidation activities

3. a) How to Create a Class Template in Google Classroom?
b) Discuss the use of Google calendar in the in Google classroom?
4. Benefits of Using Google Apps for Education

5.9.3. Extended activities

2. Briefly explain how Google Apps help in education as eLearning tool
 - a) Google form
 - b) Google sheet
 - c) Google classroom
 - d) YouTube
 - e) Calendar
3. Give at least five benefits of Using Google Apps for Education.
4. Create a feedback tool that will collect different student's comment on presentation session done.
5. What are calendar management practices used to improve productivity in the remote work environment?

BIOGRAPHY

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