

REPUBLIC OF RWANDA



MINISTRY OF EDUCATION



Kigali, 2015

ICT SYLLABUS FOR LOWER SECONDARY

Kigali, 2015

©2015 Rwanda Education Board

All rights reserved:

This syllabus is the property of Rwanda Education Board.

Credit must be provided to the author and source of the document when the content is quoted.

FOREWORD

The Ministry of Education of Rwanda is honoured to provide all beneficiaries with this syllabus. It serves as an official document and guide to competency based teaching and learning, and also ensures that there is consistency and coherence in the delivery of education across all levels of general education in Rwandan schools.

The Rwandan education philosophy aims to ensure that young people at every level of education achieve their full potential in terms of the relevant knowledge, skills and appropriate attitudes and to prepare them to integrate into society and exploit employment opportunities. In line with efforts to improve the quality of education, the government of Rwanda emphasises the importance of aligning the syllabus, teaching and learning, and assessment approaches in order to ensure the system is producing the kind of citizens the country needs and desires. Many factors influence what children are taught, how well they learn, and the competencies they acquire. Among these factors are the relevance of the syllabus, the quality of teachers' pedagogical approaches, the assessment strategies and the instructional materials available. The ambition to develop a knowledge based society and the growth of regional and global competition in the jobs market has necessitated the shift to a competency-based syllabus. With the help of the teacher, whose role is central to the success of the syllabus, learners will gain appropriate skills and be able to apply what they have learned in real life situations. Hence, they will make a difference not only to their own lives but also to the success of the nation.

I wish to sincerely extend my appreciation to the people who contributed to the development of this document, particularly the Rwanda Education Board and its staff who organised the whole process from its inception. Special appreciation goes to the development partners who supported the exercise. Any comment or contribution would be welcome for the improvement of this syllabus.

Gasana I. Janvier

Director General REB

ACKNOWLEDGEMENT

I wish to sincerely extend my special appreciation to the people who played a major role in development of this syllabus. It would not have been successful without the participation of different education stakeholders and the financial support from different donors. For this, I would like to express my deep gratitude.

My thanks first goes to the Rwanda Education Board staff who were involved in the conception and writing of this syllabus. I wish to extend my appreciation to the valuable efforts from teachers from secondary to university level during the conception of this syllabus.

I owe gratitude to different education partners such as UNICEF, UNFPA, DFID and Access to Finance Rwanda for their financial and technical support.

Special mention should also go to ESRI Rwanda for their contribution to facilitate the integration of GIS into this syllabus. I also value the contribution of other education partner organisations such as CNLG, AEGIS trust, Itorero ry'Igihugu, Center for Gender Studies, Gender Monitoring Office, National Unit and Reconciliation Commission, RBS, REMA, Handicap International, Wellspring Foundation, Right To Play, MEDISAR, EDC/L3, EDC/Akazi Kanoze, Save the Children, Faith Based Organisations, WDA, MINECOFIN and local and international consultants. Their respective initiative, cooperation and support were responsible for the successful production of this syllabus by the Curriculum and Pedagogical Material Production Department (CPMD).

Dr. Joyce Musabe,

Head of CPMD,

LIST OF PARTICIPANTS WHO WERE INVOLVED IN THE ELABORATION OF THE SYLLABUS

Rwanda Education Board

1. Dr. Joyce MUSABE : *Head of CPMD, as a Facilitator*
2. Joseph RUTAKAMIZE: *Director of Science Unit in CPMD .*
3. Jean Damascene HABANABASHAKA: *Computer Science Specialist/Software Engineer in CPMD: **Team leader.***
4. Protais Aimable RWAMBUKA: *ICT Director, Examination and Accreditation Department(EAD).*
5. Vincent NYIRIGIRA: *Quality Assurance Specialist, ICT in Education and ODel.*
6. *Anathalie NYIRANDAGIJIMANA, Pedagogical norms specialist in CPMD.*

Teachers and Lecturers

1. Dr Mathias NDUWINGOMA: *Head of Computer Science Department, UR-College of Education.*
2. Theogene TURABUMUKIZA: *Computer Science teacher at GS Gatagara, Huye District.*
3. Peter Clever NTAMUSHOBORA: *Computer Science teacher at SONRISE, Musanze District.*
4. Liliane MUHORAKEYE: *Computer Science teacher at FAWE Girl school, Gasabo District.*
5. Theoneste, UWAYEZU: *Computer science teacher at College Ami des Enfants, Gasabo District.*
6. Jerome NDAGIJIMANA: *Computer Science teacher at SOS THS Kigali, Gasabo District.*
7. Maxime RWAKA: *Sales Engineer at ESRI Rwanda, Gasabo District.*

Quality Assurer

Dinesh RAMJEE

TABLE OF CONTENTS

FOREWORD	ii
ACKNOWLEDGEMENT	iii
LIST OF PARTICIPANTS WHO WERE INVOLVED IN THE ELABORATION OF THE SYLLABUS	iv
1. INTRODUCTION	1
1.1. Background of the curriculum review	1
1.2. Rationale of teaching and learning ICT	2
1.2.1. ICT and society	2
1.2.2. ICT and learner	2
1.2.3. Competences	2
2. PEDAGOGICAL APPROACHES	5
2.1. Role of the learner	5
2.2. Role of the teacher	6
2.3. Special needs education and inclusive approach	7
3. ASSESSMENT APPROACHES	8
3.1. Types of assessment	8
3.2. Record keeping	9
3.3. Item writing in summative assessment	10
3.4. Reporting to parents	12
4. RESOURCES	13
4.1. Materials needed for implementation	13

4.2. Human resource	14
5. SYLLABUS UNITS.....	16
5.1. General presentation.....	16
5.2. Secondary one	18
5.3. Secondary two.....	36
5.4. Secondary three.....	54
6. REFERENCES	74
7. WEEKLY TIME ALLOCATION.....	75

1. INTRODUCTION

1.1. Background of the curriculum review

The ICT competence based curriculum is designed to develop learners' competences rather than just their knowledge. The syllabus focuses on what learners can do; to ensure their learning has greater purpose and is deeper than it would be otherwise. A competence-based curriculum is characterised by approaches that are largely learner-centred, criterion-referenced, constructivist, focused upon learning outcomes (rather than content definition) and have an emphasis on formative assessment.

The design of this competency based curriculum empowers Rwandans with relevant and modern ICT competences through up-to-date technologies. Technology has developed and this has implication to update the syllabus to align the curriculum with recent technologies in terms of applications, different technological devices and their use in daily life.

The syllabus reflects the recommendations, guides and vision for the country articulated in a range of different government policies. The Education Sector Strategic Plan 2013 and Vision 2020 reflect on quality education and an emphasis on science, technology and innovation, particularly in natural and applied sciences, and ICT. This syllabus responds to the Second Economic Development and Poverty Reduction Strategy (EDPRSII) and the draft ICT policy in Education 2014 to avail ICT to all categories of learners. It is also consistent with the NICI III plan, which is the strategic plan for ICT development in Rwanda in line with Vision 2020.

1.2. Rationale of teaching and learning ICT

1.2.1. ICT and society

Information and communications technology (ICT) is a dominant and pervasive part of modern life that has changed every aspect of human society. The government focuses on the comprehensive use of ICT to reach its goals stipulated in different official documents and policies. In Rwandan society ICT is the foundation for long term, sustainable and efficient government services, GDP growth, communication, corporate growth(NICIII), economic development, financial transactions, and the global distribution of jobs. Advances in information influence the value of investments, living standards, patterns of work and leisure, business efficiency and productivity, and spur competition in the marketplace.

1.2.2. ICT and learner

ICT is a subject that empowers learners with a package of skills through the use of various ICT tools namely computers, the internet, broadcasting technologies (radio and television), banking technologies and telephony to access, manipulate and provide information.

ICT as a subject provides basic computing skills and exposes learners to common application software such as word processing, spreadsheets and presentations. The internet opens up the individual to the world of communication, research and innovation, graphic and multimedia manipulation, and the advanced skills of spatial data analysis and manipulation through Geographical Information Systems (GIS).

1.2.3. Competences

The national policy documents, based on the national aspirations, identify '**Basic Competences**' alongside the '**Generic Competences**' that will develop higher order thinking skills. Basic Competencies are addressed in the stated **broad subject competences** and in the

objectives highlighted on a year on year basis and in each of the units of learning. The selection of types of learning activities must focus on what competencies the learners are able to demonstrate throughout and at the end of the learning process.

The core competencies that must be emphasised and reflected in the learning process are briefly described below and teachers will ensure that learners are exposed to tasks that help them acquire such skills.

Generic competences

Critical and problem solving skills: The acquisition of these skills will help learners think imaginatively and broadly to evaluate and find solutions to problems encountered in all situations.

Creativity and innovation: The acquisition of these skills will help learners take initiative and use imagination beyond the knowledge provided to generate new ideas and construct new concepts.

Research: This will help learners find answers to questions based on existing information and concepts and to explain phenomena based on findings from information gathered.

Communication in official languages: Teachers, irrespective of not being teachers of language, will ensure the proper use of the language of instruction by learners which will help them to communicate clearly and confidently. It will also assist learners to convey ideas effectively through speaking and writing and by using the correct language structure and relevant vocabulary.

Cooperation, inter personal management and life skills: This will help the learner to cooperate with others as a team in whatever task are assigned and to practice positive ethical moral values and respect for the rights, feelings and views of others. Learners will also perform practical activities related to environmental conservation and protection. These skills will also assist learners to advocate for personal, family and community health, hygiene and nutrition and respond creatively to the variety of challenges encountered in life.

Lifelong learning: The acquisition of this skill will help learners to update their knowledge and skills with minimum external support and to cope with the evolution of knowledge advances for both personal fulfillment and in areas that need improvement and development.

Broad ICT competences at the end of ordinary level

- Transform Rwandan citizens into technology skilled human capital for the socioeconomic development of the nation.
- Provide a solid foundation of technological understanding for learners to integrate into society and the world of work.
- Familiarise learners with the use of ICT tools and their impact of ICT in daily life.
- Familiarise learners with communication and research techniques by combining skills, attitudes and values.
- Demonstrate communication, research, practical problem solving, observation, creativity and innovation in everyday life.
- Organise and manipulate information using common application software namely word processing, the internet, spreadsheets, presentations, graphics, and multimedia.
- Manipulate spatial data using Geographical Information Systems.
- Develop computational thinking and logical reasoning through computer programming.

ICT and developing competences

ICT contributes to a learner's development of critical thinking, research and problem solving, creativity and innovation, communication and cooperation skills. This will be achieved by conceptualising, analysing, synthesising, evaluating, manipulating and applying the role of various computing tools to appropriate contexts of real life, as well as analysing both hardware and software mechanisms. Learners will be able to use ICT safely, securely and ethically, to manage computing tools, and to organise and present information using word processing, spreadsheets, presentations, Geographical Information Systems, graphics and multimedia and application software.

Through ICT, learners will identify problems in information processing and conduct analysis by considering relevant functional, practical, human and socioeconomic factors. They will also draw up specifications for the ICT enabled solutions to problems. Learners will draw on a range of resources which are most suitable for solving problems and developing solutions and use appropriate methods to implement these solutions using equipment, tools and techniques sensibly. They will test, evaluate and refine solutions systematically, document solutions to problems, and appropriately apply ICTs to solve problems

2. PEDAGOGICAL APPROACHES

Learners learn best when they are actively involved in the learning process through a high degree of participation, contribution and production. Learning activities indicated in this competence-based curriculum are to enable learner-centered approaches that motivate learners to be the central element of the learning environment.

At the same time, each learner is an individual with their own needs, pace of learning, experiences and abilities. Teaching strategies must therefore be differentiated and varied, but flexible within a well structured sequences of lessons. Learner-centered education does not mean that the teacher no longer has responsibility for seeing that learning takes place.

2.1. Role of the learner

The activities of the learner are indicated against each learning unit and reflect the appropriate level of engagement of the learner in the learning process. The teaching and learning processes will be tailored towards creating a learner friendly environment based on their capabilities, needs, experience and interests.

The learning activities will be organised in a way that encourages learners to construct knowledge either individually or in groups in an active way. Learners work on one competence at a time in the form of concrete units with specific learning outcomes broken down into knowledge, skills and attitudes.

In practical lessons learners will work individually, in pairs and in groups where the availability of computers and other ICT tools will not permit working individually, but they will be encouraged to do simple project work individually.

2.2. Role of the teacher

The change to a competence-based curriculum is about transforming learning, and ensuring that learning is deep, enjoyable and habit-forming. Teachers must shift from the traditional method of instruction and play the role of a facilitator. They must let learners experience ICT content through the use of available resources in order to value each learner's individual needs and expectations.

The teacher must identify the needs of learners, the nature of the learning to be done, and the means to shape learning experiences accordingly.

A teacher's role is to organise the learners in the classroom or computer laboratory and other ICTs to engage them in the use of these ICTs through participatory and interactive methods. This ensures that the learning is personalised, active, participative and cooperative.

The teacher will design and introduce the tasks to the class to perform or for immediate discussion. The role of the teacher will be to guide the learners in constructing their own knowledge, skills and attitudes.

Learners are taught how to use the computer and other ICT tools used in different technologies. The teacher must select and develop appropriate materials like teaching models, digital content, and simulators for the learners to use in their work. In practical lessons, the

teacher first demonstrates the handling of the computer and other ICT tools followed by learners embarking on the task with hands on manipulation.

The teacher must devise remedial strategies in and outside the classroom/computer laboratory to ensure low achievers and those with learning difficulties keep pace with the rest in acquiring the required competencies.

2.3. Special needs education and inclusive approach

All Rwandans have the right to access education regardless of their different needs. The underpinning of this provision would naturally hold that all citizens benefit from the same menu of educational programs. The possibility of this assumption is the focus of special needs education. The critical issue is that we have persons/learners who are totally different in their ways of living and learning as opposed to the majority. These differences can either be emotional, physical or sensory. Traditionally intellectual learning challenges were known as mental retardation.

These learners equally have the right to benefit from the free and compulsory basic education in the nearby ordinary/mainstream school. Therefore, the schools' role is to enrol them and also set strategies and intervention measures to provide relevant education for them. The learning environment and ICT tools, teaching materials and other resources should meet the requirements of learners with special educational needs. Assessment strategies and conditions should also be standardised to the needs of these learners. Detailed guidance for each category of learners with special education needs is provided for in the guidance for teachers.

3. ASSESSMENT APPROACHES

3.1. Types of assessment

Assessment is the process of evaluating the teaching and learning processes through collecting and interpreting evidence of an individual learner's progress in learning. It is also used to make a judgment about a learner's achievements measured against defined standards. Assessment is an integral part of the teaching learning processes. In the new competence-based curriculum, assessment must also be competence-based, whereby a learner is given a complex situation related to his/her everyday life and asked to try to overcome the situation by applying what he/she has learned.

Assessment will be organised at the following levels: School based assessment, District examinations, National assessment (LARS) and National examinations.

3.1.1. Formative and continuous assessment (assessment for learning)

Continuous assessment involves formal and informal methods used by schools to check whether learning is taking place. When a teacher is planning their lesson, they should establish criteria for the performance and behavioural changes at the beginning of a unit. Then at the end of every unit, the teacher should ensure that all the learners have mastered the stated key unit competencies based on the criteria stated, before going to the next unit. The teacher will assess how well each learner mastered both the subject and the generic competencies described in the syllabus. From this, the teacher will gain a picture of the all-round progress of the learner. The teacher will use one or a combination of the following: a) Manipulation, (b)ICT tools and task/practice (c) observation, (d) pen and paper, and (e) oral questioning

3.1.2 Summative assessment (assessment of learning)

When assessment is used to record a judgment of the competence or the performance of the learner, it serves a summative purpose. Summative assessment provides a picture of a learner's competence or progress at any specific moment. The main purpose of summative assessment is to evaluate whether learning objectives have been achieved. It is also used for the ranking or grading of learners, for deciding on progression, for selection into the next level of education, and for certification. This assessment should have an integrative aspect whereby a student must be able to show mastery of all competencies.

It can be internal or school based and external in the form of district and national examinations. School based summative assessment should take place once at the end of each term and once at the end of the year. Districts will be supported to continue their initiative to organize a common test per class for all the schools to evaluate the performance and the achievement level of learners in individual schools. External summative assessment will be done at the end of P6, S3 and S6; while LARS will be done in P2 and P5 grades (in Literacy and Numeracy).

3.2. Record keeping

This is gathering facts and evidence from assessment instruments and using them to judge the student's performance by assigning an indicator against the set criteria or standard. Whatever assessment procedures used, they shall generate data in the form of scores which will be carefully be recorded and stored in a portfolio. These scores will be used for remedial actions, alternative instructional strategy and feed back to the learner, for the parents to check their child's learning progress and to advise accordingly, or for the final assessment of the learners.

This portfolio is a folder (or binder or even a digital collection) containing the student's work as well as the student's evaluation of the strengths and weaknesses of their work. Portfolios reflect not only work produced (such as papers and assignments), but also it is a record of the activities undertaken over time as part of student learning. The portfolio output (formative assessment) will be considered only as enough for three years of A level. It will also serve as a verification tool for each learner that they attended the whole learning process before they undergo the summative assessment for the subject. The results from the portfolio will contribute 50% of the summative assessment for each year.

3.3. Item writing in summative assessment

Before developing a question paper, a plan or specification of what is to be tested or examined must be produced to show the units or topics to be tested on, the number of questions in each level of Bloom's taxonomy, and the marks allocation for each question. In a competency based curriculum, questions from the higher levels of Bloom's taxonomy should be given more weight than those from the knowledge and comprehension level.

Before developing a question paper, the item writer must ensure that the test or examination questions are tailored towards competency based assessment by doing the following:

- Identify topic areas to be tested on from the subject syllabus.
- Outline subject matter content to be considered as the basis for the test.
- Identify learning outcomes to be measured by the test.
- Prepare a table of specifications.
- Ensure that the verbs used in the formulation of questions do not only require memorisation or recall answers but test the broad competencies as stated in the syllabus.

Structure and format of the examination

ICT competences for the ordinary level makes ICT content a practical oriented subject with hands on skills. For this reason, there will be two(2) papers for Information and Communication Technology(ICT) in the Ordinary level. The first paper will be theoretical testing of knowledge, skills and attitudes. Learners will be assessed on their competences to effectively use computing tools and how to locate, extract, record and interpret, exchange, retrieve, manipulate, store and use information through technology. There will be an emphasis on ICT fundamentals, safety and security, application software, programming for juniors, and network and data communication, as identified in the syllabus.

The practical paper will be arranged on the same topic areas namely ICT fundamentals, safety and security, application software, programming for junior, and network and data communication, to test learners' hands on skills. The practical paper will have questions related to manipulation of computing tools and solving real life problems using application software, communication using technological tools, and developing logical reasoning through programming. The content distribution table will assist in the choice of what content to be assessed. Note that not all topic areas and subtopic areas are to be covered.

Table: Structure and format of ICT assessment

Topic Areas	Theory	Practice
Topic Area-1	X%	Z%
Topic Area-2	Y%	T%
	50%	50%

ICT tools required for practical assessment

Assessment of ICT competences will require different types of equipment to ensure the development of the ability of learners. The computer will be the main tool used to test ICT skills during practical examinations. Different technological devices have been given an important role in this syllabus to offer competences required by society, thus upon availability of these tools the practical paper will use them. During national examinations, for both computer, portable devices, and other ICT tools; the practical paper will be conducted individually **at a one student to one device.**

3.4. Reporting to parents

The wider range of learning in the new curriculum means that it is necessary to think again about how to share a learners' progress with their parents. A single mark is not sufficient to convey the different expectations of learning that are in the learning objectives. The most helpful reporting is to share what learners are doing well and where they need to improve. A simple scale of meeting expectations very well, meeting expectations, and not meeting expectations for each of knowledge/understanding, subject skills and competencies in a subject will convey more meaning than a single mark. For school based assessments these scores do not need to be added up.

4. RESOURCES

4.1. Materials needed for implementation

The successful implementation of this ICT syllabus will require learners to have computers which are the standard equipment for this subject. Alongside computers, other ICT tools and application software have been identified and it is indicated in this syllabus where they will be needed. Various resources for the implementation of the ICT competence based curriculum are the following:

Equipment, teaching and learning materials

- **Computer laboratory:** At least two learners for one computer. Mobile lab(laptops) is highly recommended where possible.
Printer and scanner.
- **Telephony systems.**
- **Broadcasting technology:** Television and radios per school.
- **Projectors:** Presentation is a key element of the competence based curriculum where learners work. Teaching materials will be mostly displayed using a projector for both ICT as a subject but for other subjects using ICT as a tool. To assist learning and teaching ICT as well as integration of ICT in all subjects **five(5) projectors** are required per school.
- **Laptop per teacher:** Teachers needs to prepare learning and teaching materials and organise content so as to use the classroom time effectively. One laptop per teacher is required.
- **Internet connectivity.**
- **Network devices:** Switch, router, wireless access point, server, and crimping tools.
- **Software:** In most cases skills expected from this competence based curriculum do not rely on any version of operating system or any version of application software. However, the latest version of most software at the time of implementation will be used.

- **Operating system:** licensed copy of the Windows Operating System. Linux distributions are to be used if all applications reflected in the syllabus are supported. For portable devices most recent operating system is recommended.
- **Word processing, spreadsheets and presentation:** a licensed copy of latest version of Microsoft Office.
- **ArcGIS software** for spatial data manipulation.
- **Graphics and multimedia:** digital camera, Photoshop, Microsoft Picture Manager, and Movie Maker.
- **Tux typing:** for enhancing typing skills and speed for learners.
- **Browsers:** Chrome, Mozilla Firefox, Epiphany, and Opera.
- **Social media:** Twitter, Facebook, Skype, Flickr, Instagram, LinkedIn, IM(Instant Messaging) applications and Google+
- Financial Transactions
 - **ATM: ATM Simulators** for experimenting with the process of accessing, depositing and checking balances of an account using a debit/credit card. Organised visit is recommended if any ATM device is nearest the school.
 - **Telephones** for mobile banking and managing money.
 - **Billing machine or simulators.**
 - **Programmable calculator.**
- **Interactive board:** Two interactive boards per school.

4.2. Human resource

The effective implementation of this curriculum requires a joint collaboration of educators at all levels. Given the material requirements, teachers are expected to accomplish their noble role as stated above. School head teachers and directors of studies are required to follow-up and assess the teaching and learning of ICT . These combined efforts will ensure bright future careers and lives for learners as well as the contemporary development of the country.

In a special way, a teacher of ICT at ordinary level should have a firm understanding of ICT concepts at the level he/she teaches. He/she should be qualified in **ICT/Computer Science or related fields** with Education and have firm ethical conduct. The teacher should possess the qualities of a good facilitator, organiser, problem solver, listener and adviser. He/she is required to have basic skills and competency of guidance and counseling because students may come to him/her for advice.

Skills required for the Teacher of ICT

The teacher of ICT should have the following skills, values and qualities:

- Inspire children and community the devotion of learning and use of ICT
- Engage learners in variety of learning activities.
- Use multiple teaching and assessment methods.
- Adjust instruction to the level of the learners.
- Use creativity and innovation in the teaching and learning process.
- Be a good communicator and organiser.
- Be a guide/facilitator and a counselor.
- Manifest passion and impartial love for children in the teaching and learning process.
- Link the use of ICT with other subjects and real life situations.
- Have good mastery of ICT content and devotion to be lifelong learner.
- Have good classroom management skills.

5. SYLLABUS UNITS

5.1. General presentation

The ICT subject is taught in the lower secondary education level i.e. S1, S2 and S3 respectively.

At every grade where it is taught, the ICT syllabus is structured in Topic Areas. Topic Areas are themselves broken down into Sub-Topic Areas while Sub-Topic Areas are in turn made up of Units.

As for Units, they have the following features:

1. Each Unit is aligned with the number of periods that are expected to be taught.
2. Each Unit has a key unit competency whose achievement is pursued by all teaching and learning activities undertaken by both the teacher and the learners.
3. Each Unit's key competency is broken down into learning objectives as follows:
 - a. Learning Objectives relating to Knowledge and Understanding tend to use lower order thinking skills. They are actually considered to be prerequisites to learning objectives relating to skills, attitudes and values.
 - b. Learning Objectives relating to Skills, Attitudes and Values are also known as Higher Order Thinking Skills. These Learning Objectives are actually considered to be the ones targeted by the present reviewed curriculum.
4. Each Unit contains detailed content that is to be covered.

5. Each Unit is provided with Learning Activities that are expected to engage learners in the learning process as interactively as possible (learner centered and participatory approach).
6. Finally, each Unit contains Links to Other Subjects, Assessment Criteria and the Materials (or Resources) that are expected to be used to in its teaching and learning.

The following table indicates the distribution of the content by topic areas and subtopic areas as well as number of lessons allocated:

Topic areas	Sub-topic areas	Number of periods(Period=40minutes)				%Subtopic areas	%Topic areas
		S1	S2	S3	Total		
Introduction to ICT	ICT fundamental	18	10	4	32	15%	19%
	Safety and security	4	4	0	8	4%	
Application Software	Word Processing	20	8	14	46	19%	59%
	Spreadsheets	0	26	8	34	16%	
	Presentation	0	0	6	6	3%	
	GIS	12	8	10	28	14%	
	Graphics and multimedia	0	0	16	16	7%	
Computer network and Data communication		8	6	6	20	9%	9%
Programming for juniors(Scratch)		10	10	8	26	13%	13%
Total		72	72	72	216	100%	100%

5.2. Secondary one

5.2.1 Key competences at the end of secondary one

- Explain the foundation of Information and Communication Technology.
- Explain the evolution, categories, parts and role of computers.
- Navigate the Windows environment and work with Windows Explorer to introduce techniques of folder and file management.
- Maintain a computer in good working condition and use it safely, securely and ethically.
- Create and manipulate a document using word processing basic features.
- Manipulate text and use advanced formatting methods and simple objects in a document.
- Define and Recognise basic features of GIS, differentiate elements/components of the interface of the GIS application and query a map and organise map layers.
- Understand the rationale of a computer network and use the internet efficiently and effectively.
- Create a music sprite and add music with scratch and audacity.

5.2.2. ICT Units for secondary one

TOPIC AREA: INTRODUCTION TO ICT			SUB-TOPIC AREA: ICT FUNDAMENTALS	
S1 ICT	Unit 1:ICT foundation.			No of Periods: 6
Key Unit Competency: Explain the foundation of Information and Communication Technology (ICT).				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Explain ICT related concepts and terms. – List ICT tools and their appropriate use in daily life. 	<ul style="list-style-type: none"> – Use ICT related terms appropriately. – Use ICT equipment namely radio, mobile phones, televisions and computers in their relevant context by turning on and off, navigating and accessing their features)contexts. – Identify areas where ICT is used. – Select appropriate ICT tools. – Evaluate the advantages and 	<ul style="list-style-type: none"> – Appreciate the role played by ICT in the evolution of society. – Enjoy using ICT and appreciate the benefits and effectiveness of different ICT tools. 	<p>Introduction</p> <ul style="list-style-type: none"> – Data: definition and types of data, data gathering, analog and digital. – Information: definition, factors (accuracy, relevance, age, completeness, and presentation) – Communication: definition, elements of communication, and types/ways of communicating. – Technology: definition, types of technologies. <p>ICT</p> <ul style="list-style-type: none"> – Definition of ICT – ICT equipment: radio, television, phones ,tablets, ATMs, [Billing machines],satellite, projector and computers. 	<ul style="list-style-type: none"> – In groups, Learners discuss different ICT concepts. – Teacher provides available ICT tools (radios, televisions, and telephones) and Learners utilise them and deduce their use in daily life. – Learners visit a computer laboratory, and other ICT activities around the school. – Learners observe a video/documentary on the use of different ICT equipment in different organisations. Learners write an essay on the use of ICT in daily life using the available learning materials.

	disadvantages of using ICT in society.		<ul style="list-style-type: none"> - Use and interact with ICT equipment (radio, television, phones, computers) Importance of ICT - General use of ICT in: education, health, business, and communications etc. - Advantages and disadvantages. - Current use of ICT in Rwanda: education, health, business, and communication, etc. 	
Links to other subjects:				
<i>Assessment criteria: Learners are able to correctly explain the foundations of Information and Communication Technology (ICT) by correctly explaining ICT related terms. Learners can accurately perform basic manipulation of ICT equipment and can figure out the importance of ICT throughout the evolution of society, including its advantages and disadvantages. Learners can also explain how ICT is used in different industries.</i>				
<i>Materials: Computers, CD/DVD, video player, projector, text book, and digital materials.</i>				

TOPIC AREA:INTRODUCTION TO ICT			SUB-TOPIC AREA: ICT FUNDAMENTALS	
S1 ICT	Unit 2:Computer systems.			No of Periods: 6
Key Unit Competency: Explain the evolution, categories, parts and role of computers.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Explain computer related terms. - Identify the different parts, functions and characteristics of a computer. - Identify different ports and connectors. - Explain computer invention and its generations - Identify advantages, disadvantages and areas where computers are 	<ul style="list-style-type: none"> - Use computer related terms appropriately. - Convert from one unit of storage measurements to another. - Connect different ports to their corresponding connectors - differentiate computer systems and computer parts - Explain the invention and evolution of computers - Differentiate technologies used in different generations of computers - Analyse the advantages and 	<ul style="list-style-type: none"> - Appreciate the role played by computers in the evolution of society and their impact on daily life. - Appreciate how different technological advances have impacted on the evolution of computers. 	<p>Computer</p> <ul style="list-style-type: none"> - Definition of a computer, functions of computers (input, processing, storage and output), and characteristics of a computer. <p>Computer components:</p> <p>Hardware</p> <ul style="list-style-type: none"> - Central Processing Unit (ALU, register and CU), and computer peripherals (input and output). - Ports and connectors - Storage(primary storage, secondary storage/mass storage and tertiary storage), and characteristics and measurements of storage. <p>Software</p> <ul style="list-style-type: none"> - System software(operating system, utilities, programming languages, firmware, etc.). - Application software(customised and off the shelf software). - The computer system (user, software, 	<ul style="list-style-type: none"> - In groups, learners discuss different computer concepts. - Learners observe physically and /or by video/digital content provided by the teacher on the different parts of a computer system. - Group discussion on the functions of the different parts of a computer. - Individual work on the functionality of different devices that use firmware. - Learners plug and unplug different external hardware(computer peripherals) parts to their ports and connectors. - Learners observe video/digital content provided by the teacher on generations and families of computers. - In groups discuss the technologies used in different computer generations. - Teacher asks learners to write an

used.	disadvantages of different generations and areas of computer use.		<p>hardware and data).</p> <p>Computer family Microcomputer(definition and categories), minicomputer, mainframe, and super computer.</p> <p>History of computers(Invention [Charles Babbage, ENIAC]),</p> <p>Generations of computers(valves, transistors, integrated circuits, microprocessors, and artificial intelligence).</p> <p>Advantages and disadvantages of using a computer.</p> <p>Areas of computer use(education, business, office work, entertainment, communication, media, storage, security, traffic control, medicine, and weather forecasting etc.).</p>	essay on the use of computers in daily life using the available resources (text books, internet, digital content, etc.).
-------	---	--	---	--

Link to other subjects:*Physics: studying valves and transistors (circuit board).*

Assessment criteria: *Learners can accurately and correctly explain the invention and evolution of computers used in different generations. Learners can explain how computers are used in different industries and are able to precisely distinguish between the different types, parts of computers and connects them correctly..*

Materials: *Computers, video player, projector, the internet, text book, and digital materials.*

TOPIC AREA: INTRODUCTION TO ICT			SUB-TOPIC AREA: ICT FUNDAMENTALS	
S1 ICT	Unit 3: Computer navigation.			No of Periods: 6
Key Unit Competency: Navigate the Windows environment and work with Windows explorer to introduce the techniques of folder and file management.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Recognise the desktop and taskbar elements. – Explain the role of saving files in folder. – Identify the process of managing files and folders. – State the purpose of the recycle bin and why deleted files are kept in recycle bin. 	<ul style="list-style-type: none"> – Explore and customise the desktop, taskbar and start menu. – Restore deleted files and folders. – Use the control panel to customise the working environment. – Navigate window and manage files and folder hierarchically correctly. – Use computer storage devices to move data between 	<ul style="list-style-type: none"> – Adjust the computer working environment properly. – Be aware of deleting files and folders. – Appreciate the importance of correctly managing files and folders so that files can be located. 	<p>Desktop</p> <ul style="list-style-type: none"> – Definition, desktop icons, taskbar (start button, task manager, system tray, quick launch), customise the desktop, taskbar. – Explore and customise the start menu – Recycle bin(definition, role, send and restore files from the recycle bin). <p>Control panel</p> <ul style="list-style-type: none"> – Desktop background and theme, mouse pointer, desktop icons and gadgets, windows colour, screen saver, screen resolution, date and time, and keyboard layout <p>Windows:</p> <ul style="list-style-type: none"> – Definition, types of windows, (application window, and document window), window control buttons, common Windows accessories (Windows Explorer, calculator, games, 	<ul style="list-style-type: none"> – Individually or in pairs, learners add items to the start menu, add elements to the quick launch of the taskbar, send programs to the desktop as shortcuts, set the time and date, change the desktop background, change the windows colours, set the screen resolution, and change the mouse pointer and keyboard layout. – Individually or in pairs, learners create a folder hierarchy and move folders using different techniques as indicated by the teacher. – Learners create files through the notepad, choose an appropriate name for the file and save it to a defined location as directed by the teacher. Learners list them with different

	<p>computers.</p> <ul style="list-style-type: none"> – Use search techniques to find files and folders. – Analyse storage devices so that decisions can be made on what storage device should be used based on its characteristics. 		<p>and paint).</p> <p>Folder</p> <ul style="list-style-type: none"> – Create, rename, cut& paste, copy and paste, drag, and delete. <p>File</p> <ul style="list-style-type: none"> – Create, save, rename, open, delete, cut and paste, copy and paste. 	<p>views.</p> <ul style="list-style-type: none"> – Learners delete and restore files and folders from the recycle bin. – Learners use calculators and enhance the use of the mouse and keyboard by playing games, using paint and using typing software (tux typing). – Learners connect or insert storage devices to the computer. – Save and retrieve files and folders on or from different secondary storage devices.
--	---	--	---	---

Link to other subjects:

Assessment criteria: Learners are able to appropriately navigate the computer by arranging elements of the desktop, taskbar and start menu. They can perform basic settings including the background, colour, screen saver, keyboard layout, date and time, and locate a given application program or accessory using the start menu. They can create, name, rename and differentiate the copy paste and cut paste operations for a given structure of folders and subfolder). Learners are able to recognise the basic functionalities of the keyboard and use them correctly.

Materials: Computers, video player, projector, the internet, and text books.

TOPIC AREA: INTRODUCTION TO ICT			SUB-TOPIC AREA: SAFETY AND SECURITY	
S1 ICT	Unit 4: Safe, secure and ethical use of computers.		No of Periods: 4	
Key Unit Competency: Maintain a computer in good working condition and use it safely, securely and ethically.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify and follow the basic safety guidelines to prevent cuts, burns, electrical shocks, and damage to eyesight, when using computers. 	<ul style="list-style-type: none"> – Observe and apply the correct safety and security procedures when using ICT. 	<ul style="list-style-type: none"> – Appreciate and follow the basic safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight when using computers. – Show concern about computer vulnerability. 	<p>Safe Lab Procedure</p> <ul style="list-style-type: none"> – General safety and health safety, electrical safety, fire safety, proper use of cleaning tools and fire extinguishers. <p>Maintaining your computer</p> <ul style="list-style-type: none"> – General precautions, power connectivity, and precautions for connecting the mouse, keyboard and other external peripherals. <p>Maintenance precautions</p> <ul style="list-style-type: none"> – System unit, monitor, keyboard, and mouse 	<ul style="list-style-type: none"> – The teacher helps learners to practice computer safety. – The teacher assists learners to sit properly in front of the computer. – General safety: teachers assist learners to switch off computers before turning off the main power source. – Learners use detergent liquids to clean monitor. – Learners discuss why water and food are prohibited in a computer environment.
Link to other subjects: <i>Physics, Biology and Chemistry: safety in laboratories and ergonomics. Physical education: ergonomics.</i>				
Assessment criteria: <i>Learners are able to maintain a computer in good working condition and use it safely, securely and ethically.</i>				
Materials: <i>Computer laboratory, projector, the internet, cleaning tools, detergent liquid, and textbooks.</i>				

TOPIC AREA: APPLICATION SOFTWARE			SUB-TOPIC AREA: WORD PROCESSING	
S1 ICT	Unit 5: Word processing basics I.			No of Periods: 10
Key Unit Competency: Create and manipulate a document using basic word processing features.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify the basic features of a word processing environment. – Explain the role of word processing applications. – State the steps used to create, rename, save and open a document. – Explain how written text should be organised. – Recognise errors in a 	<ul style="list-style-type: none"> – Explore the environment of word processing applications. – Use the basic features of word processing(create, rename, save and open a new document). – Organise written text. – Apply different methods to move text and move through the text(use of shortcuts). – Use formatting tools to improve 	<ul style="list-style-type: none"> – Appreciate the basic features of a word processing environment. – Show confidence in improving presentation by replacing hand written documents with printed ones. – Show interest in organising text. – Appreciate the formatting and proofing features of word processing to produce error 	<p>Word processing</p> <ul style="list-style-type: none"> – Definition and role of word processing applications. – Starting word processing applications. <p>Word processing environment</p> <ul style="list-style-type: none"> – Title bar, tabs, menus, toolbars, scroll bar, ruler, and status. <p>Working with documents</p> <ul style="list-style-type: none"> – Create, save, open and renaming existing document, bar, working zone/area. <p>Text selection</p> <ul style="list-style-type: none"> – Select a character, word, sentence, paragraph and the whole document. <p>Basic text formatting</p> <ul style="list-style-type: none"> – Font (color, size, bold, italic, underline, face, and change case). – Paragraph(indents, spacing and lists, alignment, borders and shading, and sorting). 	<ul style="list-style-type: none"> – In a computer lab, learners create, rename, save and open a document. – Learners are given written exercises to label elements of a word processing environment- screenshots. – Practical exercises on a given text and perform the following: selection, basic text, indents and lists formatting, moving text, indents and lists. – Learners perform spelling and grammar checks and use the thesaurus feature to correct errors in a document.

<p>document and identify the appropriate proofing features to correct the errors.</p> <ul style="list-style-type: none"> – Identify different methods to move through the written text. 	<p>the presentation of a document.</p> <ul style="list-style-type: none"> – Use proofing the features of spell, and grammar checks and the thesaurus to correct errors in a document. 	<p>free and well presented documents.</p>	<p>Proofing features</p> <ul style="list-style-type: none"> – Spelling and grammar check and thesaurus. <p>Move a section of text and move through the text</p> <ul style="list-style-type: none"> – Cut, copy and paste text. – Move through the document using keyboard shortcuts (ctrl+home, ctrl+end, end, home,pg up, pg dn). – Scrolling though the text, deleting text, undo and redo changes, and find and replace. 	
--	--	---	---	--

Link to other subjects: *English, French: formal extended writing.*

Assessment criteria: *Learners can create, save and open an existing document. They can select a given part of a document and apply formatting. They can move correctly to a given section of the document. They can accurately apply basic shortcuts keys in a document to save the time of using the mouse.*

Materials: *Computers, projector, soft documents and hard copies, text books, and the internet*

TOPIC AREA:APPLICATION SOFTWARE		SUB-TOPIC AREA: WORD PROCESSING		
S1 ICT	Unit 6: Word processing basics II		No of Periods: 10	
Key Unit Competency: Manipulate text and use advanced formatting methods and add simple objects in a document.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Explain the techniques for manipulating a document. – Recognise the proofing features for editing a document including using track changes. – State when to use columns and breaks in a document. 	<ul style="list-style-type: none"> – Manipulate a document by managing the layout of the page and the entire document. – Apply different methods to format text in a document. – Use proofing features for editing a document including track changes. – Use columns and breaks to organise the document. 	<ul style="list-style-type: none"> – Show interest in formatting and manipulating a document. – Appreciate advanced formatting and proofing features of word processing for editing a document including using track changes. 	<p>Manipulating a document</p> <ul style="list-style-type: none"> – Page setup (setting margins, orientation, page borders and background, and watermarks). <p>Proofing features</p> <ul style="list-style-type: none"> – Track changes, adding comments, and word count. <p>Columns and breaks</p> <ul style="list-style-type: none"> – Insert columns (presets and user defined). – Breaks (page, column, text wrapping, next page, and continuous). <p>Formatting text</p> <ul style="list-style-type: none"> – Styles(headings, create a style, apply a style, and clear formatting). – Nested lists (bullets and numbering). – Drop caps. – Headers and footers, and page numbers. 	<ul style="list-style-type: none"> – Learners type a document with borders, background, a watermark, and perform the correct alignment. – Learners use track changes to indicate modification, use comments and carryout a word count check. – Learners add columns and use different breaks to make the document useful based on the teacher's guidelines. – Facilitated by the teacher, learners format a document and emphasise the use of bullets and numbered lists as they are available in the document. – Learners add a useful header including information of their school . – Learners create footers and page numbers and to use different numbering while across different sections.

Link to other subjects: *English, French: presentation of extended writing, punctuation and spelling.*

Assessment criteria: *Learners can accurately format the layout of the page, use breaks and columns and apply advanced formatting through the use of styles and nested lists in a document. They can add headers, footers and numbering to the whole document as well as to a given section of the document.*

Materials: *Computers, projector, soft documents and their hard copies. text books, and the internet.*

TOPIC AREA: APPLICATION SOFTWARE			SUB-TOPIC AREA: GIS	
S1 ICT	Unit 7: GIS and maps.			No of Periods: 12
Key Unit Competencies: <ul style="list-style-type: none"> • Define and recognise basic features of GIS. • Differentiate the elements/components of the interface of the GIS application. • Query a map and organise map layers. 				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Understand the basic concepts of GIS. – Identify different elements of the interface of an ArcMap. – Know how to work with maps in a GIS environment. – Know and understand how to use different navigation 	<ul style="list-style-type: none"> – Explain GIS related terms appropriately. – Explore the ArcMap environment. – Navigate a map and show a certain section of a map in different scales. – Query a map and organise map layers. 	<ul style="list-style-type: none"> – Appreciate the importance and function of GIS. 	<p>Define terms and concepts of GIS</p> <ul style="list-style-type: none"> – Java edition (AEJEE), PostGIS, and ArcExplore. – GIS, ArcGIS Desktop (ArcMap), <p>The interface of ArcMap</p> <ul style="list-style-type: none"> – Table of Contents (TOC), menu bar, status bar, main window, and toolbars. – File handling with ArcMap. – Open an existing map, save and close a map, and browse an existing map. <p>Navigation tools</p> <ul style="list-style-type: none"> – Zoom in/out, fixed zoom in/out, zoom to full extent, zoom to previous/next extent, pan, and spatial bookmark. <p>Query methods (I)</p> <ul style="list-style-type: none"> – Find and identify. – Layers in a map. 	<p>Through teacher guidelines and electronic content</p> <ul style="list-style-type: none"> – Learners identify and name different elements of the ArcMap interface. – Learners open ArcMap and browse, save, and close an existing map. – Individually or in groups, learners use navigation tools to explore a map. – Learners query a map using the identify and find tools.

tools. – Know how to identify a location using a query on a map.			– Turn off/on a layer, order layers, add/remove layer, and rename a layer.	
Link to other subjects: <i>Geography: Physical Geography.</i>				
Assessment criteria: <i>Learners are able to accurately use GIS navigation tools to navigate a map, manipulate layers and use the correct methods to query a map.</i>				
Materials: <i>Computers, projector, text books, interactive board and ArcGIS desktop.</i>				

TOPIC AREA:COMPUTER NETWORK AND DATA COMMUNICATION

S1 ICT

Unit 8: Network and internet fundamentals.

No of Periods: 8

Key Unit Competency: Understand the rationale of a computer network and use the internet efficiently and effectively.

Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Explain network and computer network terms. – Explain the role, and advantages and disadvantages of a computer network. – Identify the common types of computer networks according to geographical areas. Define the internet and world wide web(www). – Identify a webpage, 	<ul style="list-style-type: none"> – Describe a computer network, the characteristics of a network, the role, and the advantages and disadvantages of a computer network. – Classify a computer network according to geographical areas. – Research internet terms: internet, world wide web(www),webpage, web site, web browser, URL, and ISP. 	<ul style="list-style-type: none"> – Appreciate the importance and power of a computer network and the internet on daily life. – Enjoy improved communication and research by using the internet efficiently. 	<p>Computer Network concepts</p> <ul style="list-style-type: none"> – Definition of network. – Definition of computer network. – Characteristics of computer network. – Role of a computer network. – Advantages and disadvantages of a computer network. – Classification of computer network according geographical areas (PAN, LAN, MAN, and WAN). <p>Internet concepts:</p> <ul style="list-style-type: none"> – Definition of: internet, world wide web (www), webpage, web site, web browser, URL, and ISP. <p>History of the internet</p> <ul style="list-style-type: none"> – Use of the internet in daily life (communication, research, business, 	<ul style="list-style-type: none"> – In groups discuss the uses of a computer network and terminologies. – The teacher helps learners to classify computer networks according to geographical areas. – In small groups, directed by the teacher, learners conduct research using search engines. – Teacher facilitates the creation of email accounts for each learner.

<p>web site, web browser, URL, and ISP.</p> <ul style="list-style-type: none"> - Explain the importance of using the internet in daily life. - Identify different methods used to connect to the internet. - Explain the different types of search engines. - Identify and decipher search results on information from the internet. - Define and identify the advantage and disadvantages of using email 	<ul style="list-style-type: none"> - Apply different methods to connect to the internet. - Explore different search engines to perform searches on the internet. - Apply and decipher search results using techniques to filter information from the internet. - Create and manage an email account. 		<p>education, and medicine).</p> <ul style="list-style-type: none"> - Methods/ways to connect to the internet (dialup ,broadband ,WIFI). - Getting online (web browser, basic parts of a browser, and web address). <p>Search engines</p> <ul style="list-style-type: none"> - Definition of a search engine. - Advantages and disadvantage of search engines. - List of search engines (Google ,Yahoo, and Wikipedia). - Deciphering search results. <p>Electronic mail (email)</p> <ul style="list-style-type: none"> - Definition of email. - Email address. - Advantages and disadvantages of email. - Creation of an email account, send and receive email messages, organise email messages (move, delete, add or switch folders), set up an address book. - Upload (attach) to and download a file from an email. 	<ul style="list-style-type: none"> - Learners exchanges mails among themselves.
--	--	--	---	--

Link to other subjects:

Assessment criteria: Learners are able to accurately explain the basics of computer networks and are able to effectively use the internet to search for required information.

Materials: Computers, servers, radio waves, internet connectivity, routers, switches, transmission data cables, projector, and text books.

TOPIC AREA: PROGRAMMING(Scratch)				
S1 ICT	Unit 9: Music Sprite programming.			Number of periods: 10
Key Unit Competency: To be able to create a music sprite and add music with scratch and audacity.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Associate different commands to develop music. - Identify different tools in scratch that enable us to produce a melody. - Apply scratch instructions to switch on/off music. - Describe and apply different components of a scratch window to create a sound clip using audacity. 	<ul style="list-style-type: none"> - Create a music sprite. - Move the music loop to the music sprite. - Turning music on and off. - Create a tune/melody using the sound tool kit. - Create a sound clip using audacity. 	<ul style="list-style-type: none"> - Conceptualise the ICT contribution to real life especially in the field of music. - Express the desire to produce more melodies using scratch commands. - Pay attention on how to use commands and to produce music. - Be proud to arrange commands and produce a melody/music. 	<p>Create/import sprite.</p> <ul style="list-style-type: none"> - Create a new sprite or import the existing image. - Use combo blocks to play sounds - Choose the sprite especially from those from the things folder. - Manipulation of variables to program switch on and switch off. - Manipulation of: change switch by, set switch to, forever, forever...if, <p>Create a tune using the Sound Tool Kit</p> <ul style="list-style-type: none"> - To add a music script to a sprite: using play sound/play sound... until, play drum, rest for, set instrument, play note, set volume to, change volume by, etc. - Create a Sound Clip using Audacity. 	<ul style="list-style-type: none"> - Individual work on producing music splite. - In group learners discuss how to associate commands and produce nice music. - Practice how to use combo blocks, play sound, until, and switch on/off. - Practice on setting volume, notes, etc.

			- Creating a song using Sound Tool Kit.	
--	--	--	---	--

Links to other subjects: *Music: entertainment.*

Assessment criteria: *Learners create a music sprite and efficiently add music with scratch and audacity.*

Materials: *Scratch editor, internet connection, digital material, projector, and computer.*

5.3. Secondary two

5.3.1.Key competences at the end of secondary two

- Use computers safely and securely to ensure that data is protected.
- Analyse and criticise the role and impact of computing tools in financial transactions.
- Use computing tools in financial transactions.
- Insert symbols, pictures, tables and objects in a document.
- Fill a new empty map with data, use simple symbols, label features and attributes table, and navigate a map.
- Work with a spreadsheet and perform basic manipulation of cell contents using arithmetical operations.
- Manage a window, sorting and filtering data in a spreadsheet.
- Work with Spreadsheet by applying Complex formula and functions
- Identify computer network devices, mediums and peripherals and connect different computer devices to the network.
- Use social media to exchange information on social life.
- Design a game, collect data in a table and add game rules.

5.3.2. ICT Units for secondary two

TOPIC AREA: INTRODUCTION TO ICT			SUB-TOPIC AREA: SAFETY AND SECURITY	
S2 ICT	Unit 1: Data protection.			No of Periods: 4
Key Unit Competency: Use computers safely and securely to ensure that data is protected.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Describe computer user privileges. – State and identify harmful programs. – Identify the source of computer viruses. – Identify the role of antivirus and anti-spyware 	<ul style="list-style-type: none"> – Create and use computer user accounts. – Distinguish different harmful programs. – Scan external storage devices before connecting them to the computer. – Use the appropriate computer user privileges to prevent the spread of computer viruses. 	<ul style="list-style-type: none"> – Appreciate the use of limited account(guest) to prevent the spreading of viruses and the use of the administrator account only for the installation of programs and altering settings. – Be selective and careful of content on the internet. – Show concern about computer vulnerability 	<p>Protect the computer(User Privileges)</p> <ul style="list-style-type: none"> – Setting password and user’s privileges (administrator and guest). <p>Harmful programs</p> <ul style="list-style-type: none"> – Define a harmful program, and categories of harmful programs (virus, worms, spyware, trojan, root kit, malware, etc.). <p>Sources of viruses</p> <ul style="list-style-type: none"> – Internet. – Storage devices (media). <p>Measures to prevent harmful programs</p> <ul style="list-style-type: none"> – Install antivirus programs. – Avoid connecting the computer to non scanned storage devices, and avoid connecting via the browser to non secure websites. – Apply common preventive, procedures 	<ul style="list-style-type: none"> – Learners create administrator and guest accounts on the computer and set a password. – In groups, learners discuss the role of different accounts and password for private and school computers. – Learners research the types and source of viruses, their prevention and make a presentation. – Learners update antivirus and use it to scan the computer and storages.

			(antivirus scan, cleaning agent, spyware and antispyware, backup and restore, and compressing files)	
Link to other subjects:				
<i>Assessment criteria: Learners can correctly use appropriate procedures to protect computers against harmful programs. They are able to use the antivirus programs to scan computers and different secondary storages devices and can use backup and compression tools effectively.</i>				
<i>Materials: Computers, projector, external storages, storage devices, the internet, and textbooks.</i>				

TOPIC AREA: INTRODUCTION TO ICT		SUB-TOPIC AREA: ICT FUNDAMENTALS		
S2 ICT	Unit 2: ICT in financial transactions.		No of Periods: 10	
Key Unit Competency: Analyse and criticize the role and impact of computing tools in financial transactions. Use computing tools in financial transactions.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Explain the importance of using computers in financial transactions. - Know about the different technologies in financial transactions. - State and understand the impact of different technologies in financial transactions. 	<ul style="list-style-type: none"> - Explain the importance of computer transactions. - Evaluate the role of different technologies in financial transactions. - Analyse and Criticise the impact of different technologies in financial transactions. - Use ATMs and telephones for financial transactions. 	<ul style="list-style-type: none"> - Appreciate the importance of different technologies in financial transactions - Show concern for computer misuse. 	<p>The role of computers in financial transaction</p> <ul style="list-style-type: none"> - Automated operations, record keeping, and the stock exchange. <p>Impact of financial technologies in society</p> <p>Positive</p> <ul style="list-style-type: none"> - Quick service delivery. - Security in transactions. - Unlimited access to the users bank account. - Automated billing. - Replacement of people through automation. - Job opportunities. - Communication networks. - Security. - Reduce payroll expenses. - Increase revenue to country. - Solution to bank services problems (long lines, limited time for customer 	<ul style="list-style-type: none"> - In small groups the teacher helps learners to determine the role of computer use in society. - Individuals work (research) and present on different technologies and their use in financial transactions. - In small groups, the teacher helps learners to determine the impact of technologies and their use in financial transactions. - Learners visit the nearest bank and ATM and the teacher assist the learners to show them the functionalities. - In groups, learners are given telephones and do exercises in managing money, paying and buying items (airtime, electricity, water, goods, TV subscription, etc.). - Learners observe and use billing machines to record items and generate

			<p>servicing, transaction errors due to the bank personnel, excessive bureaucracy, etc.).</p> <p>Negative</p> <ul style="list-style-type: none"> – Fraud using computing tools. – Unemployment for some fields(bank agents). <p>Technologies in financial transaction e-commerce</p> <ul style="list-style-type: none"> – Process of buying and selling on the internet (using credit cards in online shops), <p>ATM</p> <ul style="list-style-type: none"> – The process of accessing, depositing and checking the balance of an account using a debit card. <p>Mobile banking</p> <ul style="list-style-type: none"> – Process of loading money on a mobile phone account, making life easier, sending and receiving money, and the security of using mobile money. 	bills for a given request.
--	--	--	--	----------------------------

Link to other subjects: *Economics and Entrepreneurship: financial transactions.*

Assessment criteria: *Learners are able to effectively manage financial transactions for saving, sending, withdrawing, buying and selling using ICT tools and technology. In these circumstances, they should reveal strategies to make money using the technologies.*

Materials: *Computers, projector, text book, internet, ATM simulator, ATM(visit), automated billing machine, and credit cards and debit cards.*

TOPIC AREA:APPLICATION SOFTWARE			SUB-TOPIC AREA: WORD PROCESSING	
S2 ICT	Unit 3: Objects in a document.			No of Periods: 12
Key Unit Competency: Insert symbols, pictures, tables and objects into a document.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify how to insert different objects, watermarks, symbols and special characters into a document. 	<ul style="list-style-type: none"> – Illustrate information with different objects in a document. – Use equations to write mathematical information. – Use tables to manipulate lists with different attributes. 	<ul style="list-style-type: none"> – Appreciate the importance of adding objects in a document. – Recognise the use of tables in a document. 	<p>Objects :Insert and format text boxes</p> <ul style="list-style-type: none"> – Insert a text box, format a text box, modify colours and lines, and apply fill effects. <p>Adding shapes</p> <ul style="list-style-type: none"> – Insert shapes, format shapes, add text in shapes, and use drawing tools. <p>Insert picture and word art objects</p> <ul style="list-style-type: none"> – Insert a picture from the clipart gallery and from a file, and insert a word art object. <p>Equations and symbols</p> <ul style="list-style-type: none"> – Insert symbols and special characters. – Write equations. <p>Tables</p> <ul style="list-style-type: none"> – Inserting a table, column, and row. – Deleting a row, a table, and a column. – Merging cells and splitting cells. – Drawing a table, table auto format, and formulas. – Writing in a table, and text direction. 	<ul style="list-style-type: none"> – Learners write a document on one of the following (genocide studies, gender, peace and values, Comprehensive sexuality education including STI AND HIV/AIDS) containing pictures, clip art, shapes, textboxes, etc. – Students write equations as indicated by the teacher. – Learners write various tables containing student, teacher, courses and timetable information.

			- Table properties, layout and design, and borders and shading.	
Link to other subjects: <i>Mathematics: symbols and equations.</i>				
Assessment criteria: <i>Learners are able to present and insert information graphically using objects in a document, write simple mathematical equations and present data in a table format.</i>				
Materials: <i>Computers, projector, text books, and data(images, and documents to give samples of data).</i>				

TOPIC AREA:APPLICATION SOFTWARE		SUB-TOPIC AREA: SPREADSHEETS		
S2 ICT	Unit 4: Spreadsheet basics.		No of Periods: 8	
Key Unit Competency: Work with a spreadsheet and apply basic manipulation of cell content using arithmetical operations.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Explain the role of a spread sheet. - Identify the basic features of a spreadsheet. - State how to manipulate cell contents. 	<ul style="list-style-type: none"> - Apply various methods to move, delete, and enter data from and into cells. - Manipulate a worksheet and interconnect different worksheets. - Use arithmetic operations to manipulate cell data. 	<ul style="list-style-type: none"> - Appreciate the functions and effectiveness of a spreadsheet and its use in different sectors of work. - Develop confidence when using a spreadsheet. 	<ul style="list-style-type: none"> - Definition and role of a spreadsheet. - Create, save and open a workbook. <p>Spreadsheet environment</p> <ul style="list-style-type: none"> - Title bar, menus, tool bar, scroll bar, formula bar, status bar, cell, active cell, name box, formula bar, column and row headings, and status bar. <p>Cell, row and column basics</p> <ul style="list-style-type: none"> - Definition, cell content, enter, select, copy and paste, and cut and paste cell data. - Change row height, column width, wrap text and merge cells. - Insert, delete, move, and hide rows and columns. <p>Formatting a cell</p> <ul style="list-style-type: none"> - Font. - Text alignment and orientation. - Cell borders and fill colours. - Formatting numbers and text. 	<ul style="list-style-type: none"> - In groups, learners discuss and explore basic features of a spreadsheet environment. <p>Through teacher or electronic content guidelines:</p> <ul style="list-style-type: none"> - Learners write sample data in cells and apply indicated manipulation guided by the teacher or electronic content. - Learners to link different worksheets by updating data through the grouping of worksheets. - Learners apply arithmetical operations on numerical data.

			<p>Worksheet basics – Insert, delete, rename, copy, move, group and ungroup worksheets.</p> <p>Mathematical operators – Addition, subtraction, multiplication, division, and percentages.</p>	
<p>Link to other subjects: <i>Mathematics: arithmetic operations.</i></p>				
<p>Assessment criteria: <i>Learners are able to accurately work with spreadsheets and apply basic manipulation of cell contents using arithmetical operations.</i></p>				
<p>Materials: <i>Computers, projector, text books, and interactive content.</i></p>				

TOPIC AREA: APPLICATION SOFTWARE			SUB-TOPIC AREA: SPREADSHEETS	
S2 ICT	Unit 5: Worksheet data presentation.			No of Periods: 6
Key Unit Competency: Manage a window, sorting and filtering data in a spreadsheet				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify techniques to freeze columns and rows. – Explain the difference between sorting and filtering. – Describe the impact that sorting can have on data. 	<ul style="list-style-type: none"> – Apply freeze panes, sort and filter skills in a datasheet. – Filter the data in a spreadsheet. 	<ul style="list-style-type: none"> – Appreciate the importance of freezing columns or rows, and filtering and sorting data. 	<p>Freeze panes</p> <ul style="list-style-type: none"> – Freeze top row. – Freeze first column. <p>Workbook view</p> <ul style="list-style-type: none"> – Normal, page break preview, page layout, custom view, and split the worksheet. <p>Sort and filter</p> <ul style="list-style-type: none"> – Custom sort, A to Z, Z to A, filter by color, text, number, and custom filter. 	<ul style="list-style-type: none"> – Individually or in small groups the teacher helps learners to work on freezing columns or rows and sorting and filtering data.
Link to other subjects:				
Assessment criteria: Learners can effectively freeze panes to make static a given range of columns/rows in a spreadsheet. Learners can accurately apply filtering techniques to an amount of data to display the desired content and sort spreadsheet contents to organise data.				
Materials: Computers, projector, and text books.				

TOPIC AREA:APPLICATION SOFTWARE		SUB-TOPIC AREA: GIS		
S2 ICT	Unit 6: ArcGIS.		No of Periods: 8	
Key Unit Competency: Fill a new empty map with data, use simple symbols, label features and attributes table, and navigate a map.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Know how to create maps in ArcGIS. - Know how to use navigation tools in ArcGIS. 	<ul style="list-style-type: none"> - Add data to a map. - Work with data in a map. - Apply simple symbology techniques. - Use an attribute table. - Query a map using measure, go to XY, and hyperlink methods. 	<ul style="list-style-type: none"> - Appreciate the importance of GIS. 	<p>Creation of maps</p> <ul style="list-style-type: none"> - Open a new empty map and add data to the map. <p>Display of a layer (I)</p> <ul style="list-style-type: none"> - Symbolise layer (using one single symbol (right and left click on a layer symbol) per layer). - Add/remove labels of a layer (by right clicking on a layer and de/activation of labels). - Layer properties, source tab(red exclamation point, set data source, and show where displayed data is stored). <p>Attribute table</p> <ul style="list-style-type: none"> - Open an attribute table, ☑sort descending/ascending, and freeze and unfreeze a column. <p>Query methods (II)</p> <ul style="list-style-type: none"> - Measure, go to XY, identify, hyperlink, 	<ul style="list-style-type: none"> - Learners practically recall how to open an existing map, turn on and off layers, and order and rename layers. - Learners perform exercises on how to open a new empty map, add data and save a new map. - The teacher encourages learners to explore and change symbols by right or left clicking on the symbol. - Learners explore the presentation of labels of a layer. - Learners open and arrange attribute tables. - The teachers help learners to use a query using methods such as measure, go to XY, identify, hyperlink and select features.

			<p>and select features (use shift key for multiple selection, and clear selected features).</p> <p>– Spatial thinking techniques.</p>	
<p>Link to other subjects: <i>Mathematics: measurements and coordinates. Geography: physical geography, maps and spatial data manipulation related content).</i></p>				
<p>Assessment criteria: <i>Learners are able to open a map, fill data in new map, use symbology, label features, and use an attribute table.</i></p>				
<p>Materials: <i>Computers, projector, ArcGIS desktop, and text books.</i></p>				

TOPIC AREA:APPLICATION SOFTWARE			SUB-TOPIC AREA: SPREADSHEETS	
S2 ICT	Unit 7: Complex formulae and functions.			No of Periods: 12
Key Unit Competency: Work with spreadsheets to apply complex <i>formula and functions</i> recognising the order of operations. Apply conditional formatting to the content of a worksheet. Use absolute and relative referencing.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify the order of operations to evaluate a formula involving more than one operator. – Identify the importance of referencing a cell. – Explain the roles of formula and predefined functions. – State the importance of 	<ul style="list-style-type: none"> – Use formula involving more than one operator to manipulate the content of cells. – Apply cell referencing in formulas. – Use functions to manipulate data in worksheets. – Highlight the content in a worksheet fulfilling a given condition. 	<ul style="list-style-type: none"> – Appreciate the complexity of worked worksheets. – Understand others views on well formatted tables. 	<p>Predefined operators and symbols in excel</p> <p>Formulas</p> <ul style="list-style-type: none"> – Complex formula (many operators in one formula). <p>Cell references</p> <ul style="list-style-type: none"> – Relative, absolute and mixed references. <p>Cell references of another worksheet</p> <ul style="list-style-type: none"> – Copy paste option and sheet reference. <p>Functions</p> <ul style="list-style-type: none"> – Definition of functions. <p>Mathematical:</p> <ul style="list-style-type: none"> – SUM,AVERAGE, ODD, INT,ROUND, EXP, SQRT, POWER, MOD,MAX, and PRODUCT. <p>Logical:</p> <ul style="list-style-type: none"> – AND, NOT, OR and IF. <p>Text:</p>	<ul style="list-style-type: none"> – The teacher helps learners work with spreadsheets. – Using sample data provided by the teacher, learners use complex formulas, cell referencing and functions to manipulate the content of cells. – Learners highlight specific content in a sheet based on a condition specified by the teacher.

visualising specific content in a sheet.			<ul style="list-style-type: none"> - COUNTA, COUNTBLANK, UPPER, LOWER, and REPLACE AND SEARCH. Conditional formatting - Highlight cell rules (greater than, equal to, less than, etc.), top bottom rules, data bars, color scales, and icon sets. 	
<p>Link to other subjects: <i>Mathematics: arithmetic operations, functions, equations, matrix, and logic. Economics: econometrics, Entrepreneurship: financial modeling.</i></p>				
<p>Assessment criteria: <i>Learners can accurately manipulate data and manage worksheet data using formulae, functions and use conditional formatting to present information fulfilling a given criteria.</i></p>				
<p>Materials: <i>Computers, projector, and excel applications.</i></p>				

TOPIC AREA:COMPUTER NETWORK AND DATA COMMUNICATION				
S2 ICT		Unit 8: Network components and social media applications.		No of Periods: 6
Key Unit Competency: Identify computer network devices, medium and peripherals. Connect different computer devices to the network. Use social media to exchange information on social life.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Identify devices that can be connected to the network. - Identify network resources. - Identify different network mediums. - Identify the network device and the peripherals. - Know how to use social media appropriately. 	<ul style="list-style-type: none"> - Connect devices to the network. - Explain computer network resources. - Differentiate between computer network mediums. - Differentiate computer network devices. - Share on the computer network different network peripherals. - Create a profile 	<ul style="list-style-type: none"> - Appreciate the use of network devices, peripherals, network mediums and shared resources. - Show concern for the risks associated with social networking and overall internet communication. 	<ul style="list-style-type: none"> - Devices that can be connected to a network(desktop, laptop, printers, scanners, PDAs, and smart phones). - Connect different devices to the computer network. - Network resources (services, storage space, applications). - Network medium: Cables(coaxial cable, fiber optics, twisted pair cable), and radio wave(infrared, bluetooth, and WIFI). - Computer network devices (switch, hub, access point, router, and multifunction device). - Network peripherals (scanner and printer). Social media - Value of social media, social media best practice, examples of social media (Facebook, Twitter, Google+, LinkedIn, 	<ul style="list-style-type: none"> - In groups, discuss computer network devices, mediums and peripherals. - The teacher helps learners describe different components of a computer network, resources and devices. - The teacher helps students to identify and value the best practice of different types of social media. - In small groups, the teacher helps learners to communicate using predefined social media.

	on social media and sign in.		YouTube, Blogging, Skype, etc.).	
Link to other subjects: <i>History and Citizenship: citizenship related contents.</i>				
Assessment criteria: <i>Learners are able to explain the basics of a computer network. They can correctly connect different devices to a network and can safely use social media.</i>				
Materials: <i>Computers, servers, routers, switches, transmission data cables, projector, and text books.</i>				

TOPIC AREA: PROGRAMMING(Scratch)				
S2 ICT		Unit 9: Game programming.		Number of periods: 10
Key Unit Competency: To be able to design a game, collect data in a table and add game rules.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Identify different classes needed to make a good game. - Apply detailed classes to develop a game. - Include rules in the game. 	<ul style="list-style-type: none"> - Interact with the basic classes to produce a game such as game name, sprites, sprite interaction, backgrounds, and scores and levels. - To detail each class by providing an information table to for clarity and greater understanding. - Create scripts based on the sprite interaction rules. 	<ul style="list-style-type: none"> - Choose the adequate instruction needed to produce a game. - Conceptualise the ICT contribution in real life especially in developing games. - Express the desire to produce more games using scratch commands. - Appreciate the produced game. - Pay attention on how to use commands and 	<p>Game concepts</p> <ul style="list-style-type: none"> - Game Name. - List of sprites(name, costumes, sounds, movements). - How sprites interact in this game. - Provide the list of backgrounds. - The score counter rule and level advancement rule. <p>Collect detailed data in the table</p> <ul style="list-style-type: none"> - Provide in a well drawn table (draft) each item that will guide the game designer in order to limit any kind of mistake or jumping of steps. <p>Commands to set game rules</p> <ul style="list-style-type: none"> - Switch to costume, forever, if, touching colour, broadcast, when I receive, go to, change by, show, repeat, hide, wait, stop all, point in direction, round pick random, if on edge bounce, turn, if else, etc. 	<ul style="list-style-type: none"> - Individual work on producing a game. - The learner can imagine/observe an animated game and produce it. - Group discussion on how to associate commands and produce a good game. - Practice how to include rules in the game using scratch commands such as touching colour, broadcast, when I receive, go to, change by, show, etc.

		produce a game. – Be proud of arranging commands and producing a game.		
Links to other subjects: <i>Fine Art</i>				
Assessment criteria: <i>Learners are able to efficiently design a game and add game rules.</i>				
Materials: <i>Scratch editor, internet connection, digital material, projector, and computer</i>				

5.4. Secondary three

5.4.1 Key competences for secondary three

- Understand functions of operating systems; install and use applications and utility software.
- Generate a table of contents and use one document to have multiple copies for different recipients.
- Present data graphically and use different objects in a document.
- Query a map using selections (attribute and location), create a map layout and insert map elements, use advanced symbology and labelling and print, export and send a map.
- Use different techniques to organise a printable datasheet.
- Prepare and make a presentation.
- Create graphics using basic graphic elements and edit predefined graphics.
- Explain network security and apply basic security measures.
- Explain the different use of multimedia and interactive multimedia applications and use multimedia software to create a video.
- Use complex expressions, operators and controls to design platforms.

5.4.2.ICT Units for Secondary three

TOPIC AREA: INTRODUCTION TO ICT			SUB-TOPIC AREA: ICT FUNDAMENTAL	
S3	Unit 1: Application and utility software installation.		No of Periods: 4	
Key Unit Competency: Understand the functions of operating system, install and use application and utility software				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Explain the basic functions of an operating system. - Describe computer user privileges while installing and uninstalling a program. - Explain the difference between open-source and proprietary software. 	<ul style="list-style-type: none"> - Allow program access to administrative privileges during program installation. - Download an open source application program from the internet. - Use administrative privileges to install different set-ups Install add-on/add-in to application software(brows er, Office, and 	<ul style="list-style-type: none"> - Appreciate the role of open-source application software over proprietary software to save money. - Show concern over embedded virus infection over the internet through different downloaded application files. 	<p>Functions of operating systems</p> <ul style="list-style-type: none"> - Applications, I/O, memory and CPU management. <p>Types of License for software</p> <ul style="list-style-type: none"> - Opensource and proprietary. - Download software. <p>Installation of Software</p> <ul style="list-style-type: none"> - MS Office, antivirus, Skype, browser, media player programs, burning applications, Adobe reader/Photoshop, and games. <p>Software add-on</p> <ul style="list-style-type: none"> - Definition. - Role of Add-ons(interface change, adding features, change content of webpage, etc.). (e.g. Download Helper, AdBlock, Media Player for YouTube, Mail notifier, screen capture, etc.) - 	<ul style="list-style-type: none"> - Learners discuss the role of opensource applications over proprietary and viceversa. - Learners download different software setups/installer from the internet with the teacher's guidance. - Learners install and uninstall applications provided by a teacher. - Learners download and install add-on and use them. - In groups, learners are given DVDs containing operating systems and are to follow the instructions to install on selected computers in laboratories.

	video and music players applications).		<ul style="list-style-type: none"> - Download and install add-ons. - Download file (video) using add-ons. 	
Link to other subjects: <i>Music: streaming applications for music.</i>				
Assessment criteria: <i>Learners are able to correctly explain the functions of an operating system. They should be able to follow instructions of installation set up to respond effectively, and install and uninstall correctly a given computer application.</i>				
Materials: <i>Computers, projector, text book, storage devices, the internet, Storage of different applications and operating systems, installation video</i>				

TOPIC AREA:APPLICATION SOFTWARE			SUB-TOPIC AREA: WORD PROCESSING	
S3 ICT	Unit 2: Table of contents and mail merge.			No of Periods: 8
Key Unit Competency: Generate a table of contents and use one document to have multiple copies for different recipients.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify the role of a table of contents in a document. – Identify the need to write and print a letter to multiple recipients. 	<ul style="list-style-type: none"> – Generate a table of contents for a document. – Apply and use mail merge to produce a personalised document for multiple recipients. – Protect a document with a password. – Organise and print a document. – Use a table of contents to indicate document's 	<ul style="list-style-type: none"> – Appreciate the ease with which mail merge can create personalised documents to various recipients. 	<p>Table of content</p> <ul style="list-style-type: none"> – Create, update and delete. – List of figures. – List of tables. <p>Mail merge</p> <ul style="list-style-type: none"> – Concept of mail merge, use new list of recipients, and use existing list. – Organise, print and view shortcuts. – Protect a document. 	<ul style="list-style-type: none"> – Within a document, learners create and amend a table of contents, list of figures, and tables. – Learners write a formal letter and use mail merge features to produce multiple copies to different people. – Learners adjust a document and print different orientations using the school printer, print preview, and PDF writer. – Learners protect a document using a password.

	content.			
Link to other subjects:				
<i>Assessment criteria: Learners are able to accurately generate a table of contents, list of figures, and tables. They can correctly write a formal letter and use mail merge to generate multiple copies for a number of recipients.</i>				
<i>Materials: Computers, projector, data(formal letter and list of recipients and their individual details), textbooks containing both table of contents, list of figures and tables, and the internet.</i>				

TOPIC AREA:APPLICATION SOFTWARE			SUB-TOPIC AREA: WORD PROCESSING	
S3 ICT	Unit 3: Charts and advanced objects.			No of Periods: 6
Key Unit Competency: Present data graphically and use different objects in a document.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Know how to present data graphically using charts. – Identify procedures to add and read documents added in a document as objects. – Know how to insert different objects from different programs in a document e.g. equations, excel and, portable 	<ul style="list-style-type: none"> – Illustrate information with different charts. – Insert common mathematical equations and symbols into a document. – Add documents to another word processing document. – Insert objects of different programs in a document e.g. equations, excel and, portable document format(PDFs). 	<ul style="list-style-type: none"> – Appreciate the way to present data using charts. – Show confidence when writing mathematical equations in a document. 	<p>Charts</p> <ul style="list-style-type: none"> – Common charts (column, line, pie, bar charts). <p>Formatting an object and chart</p> <ul style="list-style-type: none"> – Styles, adjust image, format an object and others. <p>Add object from files</p> <ul style="list-style-type: none"> – Document, workbook, presentation, PDF, etc. <p>Add objects</p> <ul style="list-style-type: none"> – Excel, presentation, and equation applications in a document. 	<ul style="list-style-type: none"> – Learners insert charts and common mathematical equations in a provided document. – Learners choose and insert documents, presentations, sheets and PDF files appropriately in a document by displaying the entire file or displaying them in the document as icons. – Learners use embedded files in a document by opening them, editing and making a presentation.

document format (PDFs).	– Combine multiple documents and various objects in one document.			
Link to other subjects: <i>Mathematics: equations and functions, and graphs.</i>				
Assessment criteria: <i>Learners can accurately present data graphically using charts and insert a file into a document and display the whole of it or as a shortcut in the document. They can correctly use 'Mathematical Equations Editor' to write mathematical functions and equations. They can use Excel to plot dynamic charts in a document.</i>				
Materials: <i>Computers, projector, text books, and an interactive materials.</i>				

TOPIC AREA:APPLICATION SOFTWARE		SUB-TOPIC AREA: GIS		
S3 ICT	Unit 4: ArcGIS.		No of Periods: 10	
Key Unit Competency: Query a map using selections (attribute and location). Create a map layout and insert map elements. Use advanced symbology and labeling. Print, export and send a map.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Know how to query a map using complex selections. – Explain how to export and convert ArcGIS maps. 	<ul style="list-style-type: none"> – Query a map using complex selections. – Use advanced symbology and labelling. – Produce a map layout. – Print, export and send a map. 	<ul style="list-style-type: none"> – Appreciate the ability to understand and represent geographic features. 	<p>Query methods (III)</p> <ul style="list-style-type: none"> – Select by attributes, select by location, export selected features. <p>Display of a layer (II)</p> <ul style="list-style-type: none"> – Symbolise layer (using categories and using quantities). – Add/remove labels of a layer (adjust label properties). – Display options (transparency and map tips (use primary field)). <p>Map layout</p> <ul style="list-style-type: none"> – Work with map elements, – Insert: legend, scale, orientation (grid or north arrow),text (title, author, date, sources, etc.). <p>Use page and print setup menu</p> <ul style="list-style-type: none"> – Print setup, data frame setup, and print. <p>Save and send a map</p> <ul style="list-style-type: none"> – Export map and email it (attach the exported map and send). 	<ul style="list-style-type: none"> – The teacher helps learners select on a map all the rivers that flow through a predetermined location using the tools they learnt. – Practical exercises on how to select by attributes/by location and on how to export selected features. – The teacher demonstrates how symbology can be given using categories. Afterwards learners practice symbolising layers according to categories and quantities. – The teacher helps learners work with map elements and perform exercises on how to insert a legend, scale, orientation and text. – Under the teacher’s guidance, learners perform an exercise on printing, exporting a map as a picture(eg.jpg)and sending a map.

Link to other subjects:*Geography: physical geography, and maps.*

Assessment criteria: *Learners are able to correctly query a map using complex selections and produce a map layout and print a map.*

Materials: *Computers, projector, ArcGIS, interactive board, and text books.*

TOPIC AREA: APPLICATION SOFTWARE			SUB-TOPIC AREA: SPREADSHEETS	
S3 ICT		Unit 5: Charts and objects in spreadsheet.		No of Periods: 8
Key Unit Competency: Use charts and objects in a spreadsheet, use different techniques to organise a printable datasheet.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Identify different ways of presenting data graphically. – Identify the different techniques used to organise and to print content from many sheets. 	<ul style="list-style-type: none"> – Use charts and graphics to present data graphically. – Format a range of data cells as a table to improve readability. – Apply basic data manipulation techniques to organise content in many sheets. 	<ul style="list-style-type: none"> – Appreciate the importance of organised content in many sheets. 	<p>Charts Create common chart – Column, bar, pie, line, and scatter.</p> <p>Formatting chart – Backgrounds, colours and patterns, legend, axis, and labels.</p> <p>Format cell data as a table – Table design and layout, change, etc.</p> <p>Printable datasheet – Set margins, set page numbers, and headers and footers.</p>	<ul style="list-style-type: none"> – Represent and interpret data graphically using sample data provided by the teacher. – Teacher helps learners to organise and print data from a sheet.
Link to other subjects: <i>Mathematics equations and functions, and graphs.</i>				
Assessment criteria: <i>Learners can create and format various types of charts, use tables to format the content of cells and organise a printable sheet accurately.</i>				
Materials: <i>Computers, projector, text books, and an interactive board.</i>				

TOPIC AREA:APPLICATION SOFTWARE			SUB-TOPIC AREA: PRESENTATION	
S3 ICT	Unit 6: Presentation.			No of Periods: 6
Key Unit Competency: Prepare and make a presentation				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Identify and explain the role of presentation applications. - Recognise the criteria used for a good presentations. - Understand how to insert objects into slides. - State how to distinguish between different presentation views. 	<ul style="list-style-type: none"> - Arrange and format presentation slides. - Insert objects into slides. - Explain the importance of each presentation view. - Use animations and transitions to format slides and use various slide presentation modes to display the presentation. 	<ul style="list-style-type: none"> - Appreciate the importance of organised slide content. 	<ul style="list-style-type: none"> - Role of presentation applications. - Creating, saving and opening a presentation. - Components of a presentation environment. <p>Slide</p> <ul style="list-style-type: none"> - Insert slide, slide navigation pane, copy, cut, and paste slides. - Slide title placeholder, and body content holder. <p>Objects</p> <ul style="list-style-type: none"> - Text, images, table, Clip Art, Word Art, Smart Art, shapes, charts, and media clips. <p>Formatting a slide</p> <ul style="list-style-type: none"> - Font, theme fonts, change themes and background, slide design, and slide layout. <p>Presentation views</p> <ul style="list-style-type: none"> - Normal view, slide sorter view, slide show, notes page, reading view, slide 	<ul style="list-style-type: none"> - Teacher helps learners to organise slides and choose appropriate objects for the audience. - In groups, learners are given the following topics(HIV/AIDS, peace and value, genocide prevention, gender, and the impact of computers in society) and each group makes a presentation (not less than five slides) containing text, images, and sounds. Learners focus on the use of slide transition, layout, design and animations.

			<p>master, handout master, and notes master.</p> <p>Animation of a presentation</p> <p>– Custom animation, slide transition, preview presentation, transition sound, and transition speed.</p>	
Link to other subjects:				
<i>Assessment criteria: Learners are able to prepare and make a good presentation containing images, pictures, tables, animations, slide transitions and various objects like sheets and PDF files in one presentation.</i>				
<i>Materials: Computers, projector, text books, and an interactive board.</i>				

TOPIC AREA:APPLICATION SOFTWARE		SUB-TOPIC AREA: GRAPHICS AND MULTIMEDIA		
S3 ICT	Unit 7: Introduction to computer graphics.		No of Periods: 8	
Key Unit Competency: Create graphics using basic graphic elements and edit predefined graphics.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – State the value of graphics like logos and explain computer graphics related terms. – Identify places and areas where graphics are mostly used. – State different graphics file formats. – Know and understand how to use basic vector graphic 	<ul style="list-style-type: none"> – Demonstrate the difference between vector graphics and bitmap graphics. – Creating vector graphics and bitmap graphics using basic graphic elements. – Manipulate vector graphics by using graphics features. – Manipulate bitmap graphics. 	<ul style="list-style-type: none"> – Appreciate the use of graphics to improve data presentations. – Enjoy the way graphics are used to improve the appearance of household items. 	<p>Define</p> <ul style="list-style-type: none"> – Computer graphics, model, vector graphics, bitmap graphics, image,2D, 3D, vector, raster, etc. – Graphic file format. – JPEG,GIF,PNG, and TIFF. <p>Areas of graphics use</p> <ul style="list-style-type: none"> – Advertisement. – Decoration services. – Logos. – Book illustrations. – Magazines. – Product packaging. – Entertainment. <p>Graphics software</p> <ul style="list-style-type: none"> – Paint. – Adobe Photoshop. <p>Basic graphic elements</p> <ul style="list-style-type: none"> – Lines, curves, sectors, polygons, circles, ovals, squares, rectangles, brush, spray 	<ul style="list-style-type: none"> – The teacher helps learners to define computer graphics related items. – Learners do photo shoot with a digital camera to be familiar with all operation – Learners use scanner to capture some images from papers. – Learners are given a sample of every type of graphic and they resize them and discuss and compare the different types. – Learners are given a sample of every type of graphics and they resize them and discuss and compare the different type. – In small groups, teacher facilitates students to create a vector and bitmap graphic using graphic elements

<p>elements to create a graphic.</p>			<p>and fill tools.</p> <p>Graphic features</p> <ul style="list-style-type: none"> – Copy and paste, duplicate, move and arrange(for align and order), resize, flip(reflexion), skew (shear, slant), rotate, group, combine, cut out, trim, weld, and intersect – Reshape vector graphics. – Manipulate nodes and control points. <p>Graphics formatting</p> <ul style="list-style-type: none"> – Colours for the outlines and fill of objects, and create shading and fill objects with patterns and textures. – Fonts as part of the graphic design. – Fit text to path and envelope effect. <p>Edit image</p> <ul style="list-style-type: none"> – Crop an image, resize, and magnify an area of a picture, change colour, colour picker, brightness and contrast, flip, rotate, stretch, changing pixels, brushing tools, and work with layers. 	<ul style="list-style-type: none"> – Teacher demonstrate Ms-Paint, Ms-Office Picture manager and Adobe Photoshop to create and edit graphics images and learners do hands-on exercises in these software
<p>Link to other subjects: <i>Fine Arts and Craft: drawing, painting and coloring.</i></p>				
<p>Assessment criteria: <i>Learners are able to effectively prepare a good presentation for a specific audience.</i></p>				
<p>Materials: <i>Computers, projector, graphics application(adobe Photoshop), text books, and an interactive board.</i></p>				

TOPIC AREA:APPLICATION SOFTWARE			SUB-TOPIC AREA: GRAPHICS AND MULTIMEDIA	
S3 ICT	Unit 8: Introduction to multimedia.			No of Periods: 8
Key Unit Competency: Explain the different uses of multimedia and interactive multimedia applications. Use multimedia software to create a video.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> – Know and understand multimedia. – Identify the media tools used to create images, audio and video files. 	<ul style="list-style-type: none"> – Explain different multimedia tools and applications. – Create an interactive presentation. – Use media tools to create digital images, video and audio files. 	<ul style="list-style-type: none"> – Appreciate the effectiveness of multimedia tools and applications in presentations. – Creativity and appreciation of media in the society. 	<p>Introduction</p> <ul style="list-style-type: none"> – Definition, different types of media, media applications, hardware and software requirements, and techniques or steps. <p>An interactive multimedia</p> <ul style="list-style-type: none"> – Create hyperlinks to:a location in the current presentation, another presentation, a file, and an e-mail address. <p>Create action buttons</p> <ul style="list-style-type: none"> – Buttons for: play or stop, inserted sound/movie during presentation, playing a CD during presentations, and adding sound/movie effects to an animation. <p>Create digital images and video audio files</p> <ul style="list-style-type: none"> – Create images using media tools, 	<ul style="list-style-type: none"> – Teacher helps learners to understand and explain the multimedia tools and applications. – In small groups, the teacher facilitates learners to create hyperlinks. – In groups, learners use media tools to capture images, video, audio or search images on the internet to create interactive media files.

			record video and audio, digitise and edit created images by cropping, save created images and video and audio files.	
Link to other subjects: <i>Music: video making.</i>				
Assessment criteria: <i>Learners are able to correctly create a multimedia file using multimedia tools.</i>				
Materials: <i>Computers, projector, text books, scanner, digital cameras, phone camera, microphone, flash media files, and headphones.</i>				

TOPIC AREA:COMPUTER NETWORK AND DATA COMMUNICATION				
S3 ICT	Unit 9: Network security.		No of Periods: 6	
Key Unit Competency: Explain network security and apply basic security measures.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Explain why security is important. - Identify security threats. - Identify security procedures. 	<ul style="list-style-type: none"> - Describe why security is important. - Describe security threats. - Apply security measures to prevent unauthorised access, misuse or modification of data flowing through the network. - Apply network security concepts to prevent unauthorised intruders from 	<ul style="list-style-type: none"> - Be aware of data flowing through the network. - Feel secure when using the network. 	<p>Definition</p> <ul style="list-style-type: none"> - Security. - Threat. - Authentication. - Authorisation. - Encryption. - Decryption. - Firewall. - Importance of computer security. <p>Security threats</p> <ul style="list-style-type: none"> - Physical(events/attacks that steal, damage, or destroy equipment). - Data (events/attacks that remove/change, corrupt, deny access, allow access, or steal information). - Viruses, worms, spyware and trojans - Social engineering. <p>Security procedures</p> <ul style="list-style-type: none"> - Protect physical equipment. 	<ul style="list-style-type: none"> - Teacher helps learners to understand computer security. - Teachers organise group work where learners apply network security concepts like, authentication, authorisation to access equipment and data.

	intercepting data travelling through the network or to initiate commands disrupting the network's normal operation.		– Protect data Basic security precautions	
Link to other subjects:				
<i>Assessment criteria: Learners are able to correctly secure data travelling through the network.</i>				
<i>Materials: Computers, servers, routers, switches, transmission data cables, projector, and text books.</i>				

TOPIC AREA: PROGRAMMING				
S3 ICT	Unit 10: Platform game programming		Number of periods: 10	
Key Unit Competency: To be able to use complex expressions, operators and controls to design platforms.				
Learning Objectives			Content	Learning Activities
Knowledge and understanding	Skills	Attitudes and values		
<ul style="list-style-type: none"> - Describe the platform and its role. - Apply different colours to produce more interesting backgrounds. - Manage the interaction with platform sprites. - Identify and add levels to games. 	<ul style="list-style-type: none"> - Explain the meaning and the role of platform. - Practice the creation of platform sprites. - Explore the interaction with platform sprites. - Add a level to a game. 	<ul style="list-style-type: none"> - Choose the tools needed to design a desired background. - Express a desire to produce more platforms using scratch facilities. - Appreciate the platforms produced. - Pay attention on how to use scratch tools and produce platforms. - Be proud of arranging different tools and produce a platform. 	<p>Concepts of platform and its usage</p> <ul style="list-style-type: none"> - Create platform sprites. - Interact with platform sprites. - Role of platforms in scratch. <p>Create a platform sprite</p> <ul style="list-style-type: none"> - Pick a colour, design a needed item, use (edit, copy, etc.), use fill tool, and build a combo block. <p>Sample commands for sprite manipulations</p> <ul style="list-style-type: none"> - Colour is touching, repeat until, change by, when key pressed, switch to costume; if, etc. <p>Sample controls</p> <ul style="list-style-type: none"> - If, forever, repeat until, point in direction, move steps, touching, show/hide, if else, switch to costume, set to, etc. 	<ul style="list-style-type: none"> - Individual work on producing platforms. - Group discussion on how to associate scratch tools/facilities and produce a planned platform. - Practice how to use colours, copy, edit, and build combo blocks. - Practice on using commands to add a level of a game.

Links to other subjects: *Fine Art, Mathematics.*

Assessment criteria: *Learners are able to correctly use complex expressions, operators and controls to design platforms.*

Materials: *Scratch editor, digital material, projector, and computer.*

6. REFERENCES

1. MINEDUC, (2013), Education Sector Strategic Plan, Kigali.
2. MINEDUC, (2014), ICT in Education Policy, Kigali: MINEDUC.
3. MYICT, (2011), National ICT strategy and plan NICI III-2015, Kigali.
4. National Curriculum Development Centre (NCDC), (2006), ICT syllabus for Lower Secondary Education, Kigali, Rwanda
5. National Curriculum Development Centre (NCDC), (2011), ICT Syllabus for Upper Secondary, Kigali, Rwanda
6. Curriculum Planning & Development Division, 2007, Computer Applications Syllabus Lower Secondary Normal (Technical), Singapore
7. Niccola Perez, 2013, Secondary ICT, Moran Publishers Limited, Kenya
8. Raymond Treier & Carmen Treuthardt Bieri & Michael Wuthrich & Martina Fortser, 2008, Geographic Information systems (GIS)- Basics and exercises for secondary education, MINEDUC, Kigali, Rwanda
9. Free Online Learning at GCFLearnFree, Retrieved March 2014,
<http://www.gcflearnfree.org>,
10. Information and communication technologies for development, Retrieved March 2014,
http://en.wikipedia.org/wiki/Information_and_communication_technologies_for_development
11. Scratch - Imagine, Program, Share, Retrieved July 2014,
<https://scratch.mit.edu/>

7. WEEKLY TIME ALLOCATION

Core subjects	Weight (%)	Number of Periods (1 period = 40 min.)		
		S1	S2	S3
1. English	11	5	5	5
2. Kinyarwanda	7	3	3	3
3. Mathematics	13	6	6	6
4. Physics	9	4	4	4
5. Chemistry	9	4	4	4
6. Biology and Health Sciences	9	4	4	4
7. ICT	4	2	2	2
8. History and Citizenship	7	3	3	3
9. Geography and Environment	7	3	3	3
10. Entrepreneurship	4	2	2	2
11. French	4	2	2	2
12. Kiswahili	4	2	2	2
13. Literature in English	2	1	1	1
Sub Total		41 periods	41 periods	41 periods
II. Elective subjects: Schools can choose 1 subject				

Religion and Ethics	4	2	2	2
Music, Dance and Drama	4	2	2	2
Fine arts and Crafts	4	2	2	2
Home Sciences	4	2	2	2
Farming (Agriculture and Animal husbandry)	4	2	2	2
III. Co-curricular activities (Compulsory)				
Physical Education and Sports	2	1	1	1
Library and Clubs	2	1	1	1
Total number of periods per week	100	45	45	45
Total number of contact hours per week		30	30	30
Total number of hours per year (39 weeks)		1170	1170	1170