Republic of Zambia

Ministry of General Education

Science, Technology, Engineering and Mathematics (STEM) for Secondary Education

Computer Science
Grade 8 - 9

Transitional Syllabus

Prepared and Published by Curriculum Development Centre
P.O. Box 50092
Lusaka - Zambia

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The National Anthem of Zambia

Stand and sing of Zambia, Proud and free,
Land of work and joy in Unity,
Victors in the struggle for the rights,
We've won freedom's fight.
All one, Strong and Free.

Africa is our own motherland,
Fashion'd with and blessed by God's good hand,
Let us all her people join as one,
Brothers under the sun,
All one, Strong and Free.

One land and one nation is our cry,
Dignity and peace neath Zambia's sky
Like our noble eagle in its flight,
Zambia, praise to thee.

All one, Strong and Free.

CHORUS
Praise be to God,
Praise be, praise be, praise be,
Bless our great nation,
Zambia, Zambia, Zambia
Free men we stand
Under the flag of our land
Zambia, praise to thee!
All one, Strong and Free

Vision of the Country

A prosperous middle-income Nation by 2030

Vision of Education

Quality life-long education for all which is accessible, inclusive and relevant to individual, national and global needs and value systems

Mission of Education

To guide the provision of education for all Zambians so that they are able to pursue knowledge and skills, manifest excellence in performance and moral uprightness, defend democratic ideals, and accept and value other persons on the basis of their personal worth and dignity, irrespective of gender, religion, ethnic origin, or any other discriminatory characteristic

Goals of Education

1. Producing a learner capable of:
    a. Being animated by a personally held set of civic, moral and spiritual values;
    b. Developing an analytical, innovative, creative and constructive mind;
    c. Appreciating the relationship between scientific thought, action and technology on the one hand, and sustenance of the quality of life on the other;
    d. Demonstrating free expression of one's own ideas and exercising tolerance for other people's views;
    e. Cherishing and safeguarding individual liberties and human rights;
    f. Appreciating Zambia's ethnic cultures, customs and traditions, and upholding national pride, sovereignty, peace, freedom and independence;
    g. Participating in the preservation of the ecosystems in one's immediate and distant environments;
    h. Maintaining and observing discipline and hard work as the cornerstones of personal and national development
2. Increasing access to education and life skills training
3. Building capacity for the provision of quality education
4. Creating conditions for effective coordination of policies, plans and programmes
5. Rationalizing resource mobilization and utilization.

Foreword

In an effort to promote human capital development proficient in contributing to national development, the Government of the Republic of Zambia is implementing STEM Education as one cardinal way, amongst others, of nurturing the much-needed talent and energy of the learners. STEM Education requires critical understanding and interpretation of the curriculum by teachers to enable them plan and deliver lessons that will engage learners and provoke creativity, innovativeness and critical thinking as envisaged in the Seventh National Development Plan (7NDP) roadmap. This syllabus seeks to provide education that would bring about discipline of mind and good character through acquisition of right competences by learners to be able to contribute to national development. This calls for competence among teachers and requires learning beyond the classroom; migration from conception to products, perception to reality and formalities to requirements. Therefore, the publication of this STEM Education Syllabus cannot be understated.

I thank the Minister of General Education for the tireless effort in providing informed direction on STEM Education implementation. I also thank Director Standards & Curriculum and Director National Science Centre for the technical support rendered in developing this STEM Syllabus. Sincere thanks go to all the other departments and institutions too numerous to mention for providing leadership in supporting STEM Education. Further appreciation goes to the Curriculum Development Centre (CDC) and National Science Centre teams who developed this syllabus as the bed rock of the future of STEM Education in Zambia.

Dr. Jobbicks Kalumba
Permanent Secretary- Technical Services
Ministry of General Education

Acknowledgement

The contribution of STEM Education to national development cannot be over emphasized. Zambia has two dimensional frontiers it can ride on with the STEM agenda; one being that of varied worth of natural resources and the other being land-linked position. Our country is endowed with various resources which need to be well nurtured and also used to benefit its citizens sustainably. The learners at all levels of education require ***development of skills and values***. These skills and values are required in order to be productive and ultimately contribute to socio-economic development of the country. The implementation of STEM Education requires sharing the same sense of mission by all stakeholders. To this effect, many individuals, institutions and organizations were consulted to gather their views on the existing syllabus and to accord them an opportunity to make suggestions for this STEM Education syllabus.

This STEM Education Syllabus has been aligned with a view to develop Critical, Creative and Analytical Thinkers (CCAT). To do so, the integration of STEM disciplines is highly encouraged as the acquisition of knowledge skills and values through the learning outcomes are expected to be attained by the use of constructivist learning models in which learners take Centre stage while teachers assume the facilitator role. It is therefore, expected that through this STEM Education Syllabus, desirable scientific, ICT literacy and research skills essential in the global economy will be enhanced in learners.

The Ministry of General Education wishes to express heartfelt gratitude to all those who participated in this endeavour for their valuable contributions, which resulted in the development of this syllabus. Therefore, there is need for all stakeholders to work together and see to it that STEM Education strategies are well implemented to yield desirable outcomes. With the implementation of this STEM Education syllabus underway emerging issues may arise and hence, various ideas on STEM Education will continue to be developed and shared for effective implementation. The Ministry of General Education will therefore, endeavour to make available the implementation models as they emerge to keep abreast with STEM Education.

I sincerely thank the Directorate of National Science Centre and the Examinations Council of Zambia for their technical and steadfast support rendered. Further gratitude goes to Provincial Education Officers, District Education Board Secretaries, School Administrators together with staff and other institutions too numerous to mention, for their continued support.

Cecilia N.M Sakala (Mrs.)
Director-Standard and Curriculum
Ministry of General Education

Introduction

This syllabus is driven by provisions of the 1996 National Policy on Education, "Educating Our Future", and national aspirations which demand that the education system should aim at producing a learner capable of appreciating the relationship between scientific thought, action and technology on the one hand, and sustenance of the quality of life on the other.

Rationale

Computer Science gives learners Vital 21st Century Skills. The Computer Science Syllabus will enhance learners' abilities to innovate and create new technologies that will drive local and national economies. This ability to innovate with technology is also important for learners' competences development and their future success to contribute positively in a global society.

General Aims

The aims of Computer Science syllabus are:

1. Provide quality education through practical engagement
2. Communicate the principles of Computer Science accurately and meaningfully through relating thinking to real life situations

Objectives

The Objectives of Computer Science syllabus are to produce a learner who is a:

1. Critical, Creative and Analytical Thinkers (CCAT)
2. Able to relate thinking with real world situations
3. Problem-solvers
4. Responsible citizens

Expected Outcomes

The expected outcomes of this syllabus are learners who are:

1. Critical, Creative and Analytical Thinkers (CCAT)
2. Able to relate thinking with real world situations
3. Problem-solver
4. Responsible citizen

Structure of the Computer Science Syllabus

The Computer Science syllabus is structured under the headings of Topic, Value, Learning outcomes, Knowledge and Skills. In this context:

Topic is a broad subject matter encompassing a range of concepts.

Knowledge is the scientific information, concepts, facts that will be acquired through practical experiments and research.

Value is the regard that a concept or topic holds to deserve the importance, worth, significance and usefulness to an individual, society and environment.

Skills are abilities that are acquired to perform particular actions. In Computer Science the skills to be enhanced are Acquisitive, Organizational, Creative, Manipulative and Communicative.

Learning outcomes are specific knowledge, skills and expertise that learners will achieve from a learning activity. In the Computer Science syllabus, the learning outcomes are organised at three levels namely;

1. Demonstration of theoretical understanding of Computer Science concepts, principles
2. Application of theoretical understanding of Computer Science concepts, phenomena, facts, ideas through research, practical, experimental and investigative practice
3. Product development based on theoretical understanding of Computer Science concepts phenomena, facts, ideas through research, inventions and innovations

Note: The learning outcomes in this syllabus have been organized in a particular order but this is not intended to suggest a teaching order. Teachers are expected to develop a considerable flexibility in planning and delivery of lessons.

Methodology

The methodologies to be used in the teaching and learning of this Computer Science syllabus are anchored on constructivist learning theories. The tenets for the constructivist learning approach to be undertaken in this syllabus should follow:

1. Problem Presentation [Teacher] (*Situation/*Key question)
2. Hypothesizing [Learners]
3. Designing Solutions [Learners]
4. Presentation of Solutions [Learners]
5. Confirmation of Solutions [Learners & Teacher]

In order for this approach to be effective the teacher and learners have roles to undertake during the teaching and learning process.

Role of a Teacher

In this model teachers will take the role of a **facilitator.** They should incorporate various learning strategies which include:

1. Inquiry Discovery: Learners interact with the environment through exploration and manipulation
2. Problem Based Learning: learning by analyzing relevant facts through problem solving
3. Problem Solving: Learning by solving an open-ended trigger problem
4. Masterly Learning: Evidence based learning in which great time is spent on depth of content
5. Research Approach: Learners assume the role of researchers and go through all the stages of the research process
6. 5 E s Approach: Learning through engagement, exploration, explanations, elaboration and evaluating
7. Subjective Learning: Learning which involves space for learners to present their own ideas, conceptions and misconceptions
8. Experiential Learning: Learning through hands-on experiments
9. Field Work: Learning outside the classroom where learners can explore, discover and experience Physics in everyday life
10. Model Building: Learners designing and constructing a representation of a concept or an object
11. Projects: Learners finding out about a phenomenon over a period of time.

To further emphasize the learning of Computer Science using constructivism, teachers are encouraged not only to familiarize themselves with the scope and sequence of the subject to establish connections of concepts but also incorporate various learning strategies that encourage collaboration such as think pair share, peeragogy, and heutagogy to meet the learning styles of learners.

Role of a Learner

The role of learners in this constructivist approach will be to take Centre stage in the learning process. For learners to be in charge of their own learning individual peeragogy, heutagogy as well as think pair share should be among the learning styles.

Assessment

The types of assessment in this syllabus will be formative and summative. In both of these two types of assessment the process and product will be given attention with emphasis on skill acquisition. A variety of methods will be used to assess learning.

Summative Assessment

In Computer Science, summative assessment will be administered by the Examinations Council of Zambia (ECZ). Summative assessment in Computer Science shall be at the end of two years and shall be 35% of the total aggregate marks.

Formative Assessment

Formative assessment will comprise of the school-based assessment (SBCA). The School Based Continuous Assessment is 65% of the aggregate scores and will include; tests, assignments, practicals, research, and workbook management.

The scheme of assessment consists of school-based assessment and summative assessment as outlined below:

1. Assignments 30%
2. Practical's 20%
3. Tests 10%
4. Workbook 5%

Apart from the above, Research is part of formative assessment and will have an aggregate score of 100 %.

Assignments

Assignment are tasks assigned by teachers to STEM learners for completion outside regular class time on content already done or yet to be done. Learners will be required to do one assignment per Term at this level. There will be no assignment in Term 3 of Grade 9. The total number of assignments will be 5 at junior. Each assignment will carry 10% marks except for the research-based major assignment which will carry 20% of the 65% allocated for assignments. At the end of grade 9 level the aggregate will be found by dividing the total marks obtained by the number of assignments given as outlined in the assignment score guide.

<table>
<tr><th rowspan="2">Grade Level</th><th rowspan="2">Type</th><th colspan="4">Assignments</th><th rowspan="2">Weight</th><th rowspan="2">Aggregate Score</th><th rowspan="2">Weight</th><th rowspan="2">Overall Score</th></tr>
<tr><th>Term 1</th><th>Term 2</th><th>Term 3</th><th>Yearly</th></tr>
<tr><td rowspan="2">8</td><td>Major</td><td></td><td>1</td><td></td><td>1</td><td>20%</td><td>$\frac{Score\ obtained}{Total\ score} \times 20\%$</td><td rowspan="3">30%</td><td rowspan="3">Major assignment % score + Minor assignment % score</td></tr>
<tr><td>Minor</td><td>1</td><td></td><td>1</td><td>2</td><td>10%</td><td rowspan="2">$\frac{Sum\ percentage\ score}{Number\ of\ assignments}$</td></tr>
<tr><td>9</td><td>Minor</td><td>1</td><td>1</td><td></td><td>2</td><td></td></tr>
</table>

Practicals

Practicals are assessment tasks which involve learners working in groups or individually as they observe and manipulate objects to build up understanding of concepts through collection, processing and interpreting data. Practical Work will carry 20 % of the 65 % marks allocated for Continuous Assessment. At the end of the level the aggregate will be found by dividing the total practical scores by the number of practicals undertaken as outlined in the practical score guide.

Grade Level	Practicals			Weight	Aggregate Score
	Term 1	Term 2	Term 3		
8	Score of all practicals	Score of all practicals	Score of all practicals	20%	or $\frac{sum\ percentage\ \ practical\ scores}{number\ of\ practicals}$ $\frac{sum\ \ of\ practical\ \ scores}{total\ number\ of\ practical\ scores} \times 20\%$
9	Score of all practicals	Score of all practicals	Score of all practicals		

Tests

Tests are written tasks with a specified time allocation intended to measure a learner's knowledge and skills. Learners are required to write these tests on hardcopy or softcopy. Some electronic tests will be required to be answered and submitted in real time. The tests will carry 10 % of the 65 % weight allocated for continuous assessment. Learners are required to undertake two tests per term (1 Mid and 1 End). There will be no tests in Term 3 of Grade 9. The total number of tests will be 10. Each test will carry 10 % marks. The aggregate test scores will be found by dividing the total test scores by the number of tests as shown test score guide below:

Grade Level	Term 1		Term 2		Term 3		Total	Level Total	Weight	Aggregate Score for Test Assessment
8	Mid Term	End Term	Mid term	End Term	Mid Term	End Term	6	10	10%	or $\frac{sum\ percentage\ score}{total\ number\ of\ tests}$ $\frac{sum\ test\ scores}{total\ number\ of\ scores} \times 10\%$
9	Mid Term	End Term	Mid term	End Term	**No Test**		**4**			

Research

Research is a sandwich intermediate process in which the theories in STEM Education are transited into evidence-based products closer to prototype status as the learners go through the learning process. Learners will be required to write a research report, defend the research and make a product. The weighting for research is as shown in the research score guide below:

Component	Weight	Total	Aggregate Component Score	Total Score
Research Report	30%	100%	$\frac{Total\ report\ score}{30} \times 30\%$	Total Score = Sum of Report % score + Defence % score + Product % score
Defence (power point presentation)	30%		$\frac{Total\ defence\ score}{30} \times 30\%$	
Research Product	40%		$\frac{Total\ product\ score}{40} \times 40\%$	

Workbook

A Workbook is a learner repository platform in either soft or hard copy format in which learners are expected to have a record of practical's, assignments, tests, daily reflections and research activities. Learners workbooks will be assessed once at the end of each term and each workbook's assessment will carry 5%. Therefore, at Junior Secondary School, work book assessment will be 6 times. The total aggregate score for workbook assessment at Junior Secondary School level will be 5% and this will be obtained by dividing the total workbook scores by 6 terms as shown in the following workbook score guide

Grade Level	Workbook Assessment			Number of workbook assessment	Total Number of workbook assessments	Weight	Total aggregate for Workbook assessment
8	End Term 1	End Term 2	End Term 3	3	6	5%	$\frac{sum\ percentage\ workbook\ score}{number\ of\ workbook\ assessments}$ or $\frac{sum\ of\ workbook\ scores}{total\ number\ of\ workbook\ assessments} \times 5\ \%$
9	End Term 1	End Term 2	End Term 3	3			

Summary of Assessment

Type of assessment	Scheme of Assessment	Item Description	Marks Allocation (%)	Total marks Allocated %)
Examinations Council of Zambia	Theory	Summative Assessment	35	**35%**
School Based	Assignment	Continuous Assessment (Major and Minor)	30	**65%**
	Practical's	Continuous Assessment	20	
	Tests	Continuous Assessment	10	
	Work book	Continuous Assessment	5	
	Research	Research Report	30	**100%**
		Research Defence	30	
		Research Product	40	

Scientific Skills

Category	Skills	Description of skill
1. Acquisitive Acquisitive Skills are the ability to possess and accumulate intrinsic potential for eagerness to input information through sensory channels and proprioception in both passive and active ways in order to process it for making decisions about a situation or concept.	(i) Listening	Ability to accurately receive and interpret messages in the communication process
	(ii) Observing	Ability to use five senses to derive characteristics of objects, events, attitudes and phenomena
	(iii) Searching	Ability to know where to find information - the key texts in your area, the journals, primary sources, etc., and how to get hold of them. Ability to know what information is needed – understanding topic and knowing the key concepts you should research. Knowing how to search the sources - using keywords etc. Ability to record your searches, so that you have an 'audit trail'
	(iv) Inquiring	Ability to ask questions, and then research, interpret, share, and reflect on answers Ability to apply and use higher order thinking *skills* like analysis and synthesis *Ability to develop* curiosity, critical thinking, and independent thinking
	(v) Investigating	Ability to develop active listening, questioning. interviewing, funnelling, summarising and note-taking
	(vi) Gathering data	Ability to effectively collect and curate data for research purposes
	(vii) Researching	Ability to search for, locate, extract, organise, evaluate and use or present information that is relevant to a particular topic
	(viii) Defining operationally	Ability to state how to measure a variable in an experiment
	(ix) Formulating hypotheses	Ability to state the expected outcomes of an experiment

Category	Skills	Description of skill
2. Organisational Organisational Skills are the capacity to manage and stay focused on different tasks by using time, energy, mental strength and physical space effectively through forming structures within which order of doing tasks is clear and co-ordinated to achieve the desired outcomes	(i) Recording	Ability to select and keep useful information, usually focused for a specific purpose
	(ii) Comparing	Ability to find similarities between or among objects, ideas, entities, concepts, events, or other subjects in order to organize both new and known information
	(iii) Contrasting	Ability to find differences between or among objects, ideas, entities, concepts, events, or other subjects in order to organize both new and known information
	(iv) Classifying	Ability to sort, group and arrange events, ideas, concepts and entities based on similarities and differences
	(v) Organising	Ability to create structure and order as well as to efficiently manage time, workload and resources in order to improve productivity and lower stress level
	(vi) Outlining	Ability to list the general features of a research/experiment/event/story in order to shape research/experiment/event/story as intended
	(vii) Reviewing	Ability to learn from experience in order to get more from the work, allowing for flexibility and paying attention to detail
	(viii) Evaluating	Ability to assess the credibility of the claims, and to assess the quality of the reasoning of the arguments or explanations
	(ix) Analysing	*Ability* to collect and *analyse* information, problem-solve, and make decisions Ability to develop a logical and rational approach to tackling new ideas, sorting information, and discovering creative solutions
	(x) Predicting	Ability to state the outcome of a future event based on a pattern of evidence
	(x) Inferring	Ability to explain observations and data
	(xi) Interpreting data	Ability to organise, conclude from data and make sense of data

Category	Skills	Description of skill
3. Creative Creative Skills are the ability to perceive and think in an imaginative approach about physical occurrences to enable one to find hidden patterns and make connections among apparently discrete concepts in order to generate novel or unorthodox solutions and come up with something new to address the present and future challenges.	(i) Planning ahead	Ability to develop strategies to accomplish goals Ability to anticipate what is needed to know, to have, and to do, in order to achieve set goals
	(ii) Designing	Ability to think creatively and visualise new ideas, relationships, applications, systems and products in order to develop solutions
	(iii) Inventing	Ability to get new materials or processes by disassembling items in order to manufacture discoverable devices Ability or process of creating or making up something or figuring out a way to do something
	(iv) Synthesizing	Ability to combine parts of a whole in new and different ways by thinking flexibly, determining alternatives, and finding new ways to accomplish a given task
	(v) Formulating models	Ability to create a mental or physical model of a process or event
	(vi) Sketching specimen and science apparatus	Ability to develop visual recall, rendering, and novel visualization of specimen and science apparatus
4. Manipulative Manipulative Skills are the ability to physically interact with the materials or procedures to help in understanding of the underlying principles which might also involve some alterations in order to enhance the performance of equipment and functionality of processes	(i) Using, handling and maintaining instruments	Ability to use, handle and maintain instruments and apparatus appropriately and carefully
	(ii) Demonstrating	Ability to give a practical exhibition and explanation of (how a machine, skill, or craft works or is performed). Ability to clearly show the existence or truth of (something) by giving proof or evidence
	(iii) Experimenting	Ability to test by following procedures to produce verifiable results
	(iv) Constructing	Ability to build or make something or form an idea (scientific) or theory by bringing together various conceptual elements
	(v) Calibrating	Ability to correlate readings of (an instrument) with those of a standard in order to check the instrument's accuracy and to adjust (experimental results) to take external factors into account or to allow comparison with other data

Category	Skills	Description of skill
	(vi) Measuring and using numbers	Ability to use standard and non-standard measures to describe dimensions
	(vii) Controlling variables	Ability to identify variables, keep variables constant and manipulate variables
	(viii) Handling specimen and chemicals correctly and carefully	Ability to handle and maintain specimen and chemicals appropriately and carefully
5. Communicative Communicative Skills are the ability to effectively inquire and engage others, to obtain or disseminate vital information, coherently and clearly through the use of mutually understood symbols, signs and semiotic rules in order to make sense of what is intended.	(i) Questioning	Ability to ask appropriate and relevant questions in order to obtain information, clarify a point, test knowledge or encourage further thought
	(ii) Discussing	Ability to state an opinion confidently and ask for others' opinions Ability to argue constructively, offer suggestions and express uncertainty
	(iii) Explaining	Ability to present the subject matter in a simplified form and making it acquirable Ability to use verbal and non-verbal cues at appropriate times in a discussion to show understanding by describing logically' how', 'why' and 'when' concept
	(iv) Reporting	Ability to provide status information, detailed descriptions of the tasks or communication to show presence
	(v) Writing	Ability to put feelings and ideas on paper, to organize knowledge and beliefs into convincing arguments, and to convey meaning through well-constructed text
	(vi) Criticising	Ability to judge the merits and faults of something Ability to provide constructive arguments for improvement, and being able to withstand the pressure of unfair or dispiriting criticisms while motivating oneself to work harder and better instead of giving up
	(vii) Graphing	Ability to read, construct, analyse and interpret graphs and graphical information in order to visually communicate information
	(viii) Teaching	Ability to use appropriate pedagogy and didactics in order to facilitate learning and communication
	(ix) Communicating	Ability to use words or symbols to describe an action, object or event

Grade 8 Computer Science	
General Outcomes	**Key Competences**
1. Demonstrate theoretical understanding of Computer Science, Information and Communication Technology, Application Packages 2. Apply the theoretical understanding of Computer Science, Information and Communication Technology, Application Packages 3. Design and develop products based on the theoretical understanding of Computer Science, Information and Communication Technology, Application Packages	Demonstrate Scientific skills such as: • Acquisitive • Organizational • Manipulative • Creative • Communicative

Grade 8 Computer Science Syllabus Content

Topic	**Value:** *Humans have revolutionised the way of sending, receiving and storing information over the years in order to be more efficient. Communication informs communities on issues of socio-economic importance, development, security and entertainment, among others. Computer technology creates multi-faceted platforms for quick and effective sharing of wide range of information for satisfactory comprehension and informed decision making. Studying Information and Communication Technologies will aid learners in developing analytical skills and critical minds for constructive contributions on concerns affecting them and society at large.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
8.1 Computer Science	8.1.1. Learning environment	8.1.1.1 Demonstrate theoretical understanding of the Computer Science Learning environment	Theories of Computer Science learning environment such as: • Computer laboratories • Computer gadgets • Connection infrastructure • Safety • Manufacturing and processing industries • Communication and transport systems	Acquisitive Organizational Communicative
		8.1.1.2 Apply theoretical understanding of the Computer Science Learning environment	Application of theories of Computer Science Learning environment based on: • Computer laboratories • Computer gadgets • Connection infrastructure • Safety • Manufacturing and processing industries • Communication and transport systems	Acquisitive Organizational Manipulative Communicative

<table>
<tr><td rowspan="3">Topic</td><td colspan="3">Value: Humans have revolutionised the way of sending, receiving and storing information over the years in order to be more efficient. Communication informs communities on issues of socio-economic importance, development, security and entertainment, among others. Computer technology creates multi-faceted platforms for quick and effective sharing of wide range of information for satisfactory comprehension and informed decision making. Studying Information and Communication Technologies will aid learners in developing analytical skills and critical minds for constructive contributions on concerns affecting them and society at large.</td></tr>
<tr><td rowspan="2">Sub-topic</td><td rowspan="2">Learning Outcome</td><td colspan="2">Content</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td></td><td>8.1.1.3
Design and create products based on theoretical understanding of the Computer Science Learning environment</td><td>Design and develop Computer Science Learning environment products based on:
Computer laboratories
Computer gadgets
Connection infrastructure
Safety
Manufacturing and processing industries
Communication and transport systems</td><td>Organizational Creative Manipulative Communicative</td></tr>
</table>

Topic	**Value:** *The 21st Century is characterised by the generation, transmission, sharing and retrieval of information spanning all aspects of life. Information and Communication Technology (ICT) has been developed in order to coordinate and manage the information with the speed and accuracy that matches the pace of the activities across various fields of operations. The knowledge of ICT will not only help learners to cope with the current and future trends, but also position them strategically to contribute to the effectiveness of the systems for the betterment of humanity. Further, learners will be able to fix computer challenges that do not require high-tech.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
8.2 Information and Communication Technology (ICT)	8.2.1. ICT Components, Roles, Tools and Concerns	8.2.1.1. Demonstrate theoretical understanding of ICT Components, Roles, Tools and concerns	Theories of ICT Components, Roles, Tools and Issues such as: • Information Technology (telephone lines and wireless signals, networking and other physical devices) • Communication Technology tools • Components (Hardware, Software, Information, Protocols) • Motherboard • CPU, RAM, ROM, Graphics Card, Storage, Data Buses) • Input and Output Interfaces • Functions of BIOS, UEFI & CMOS) • Roles (electronic technologies and techniques) • E-services (e-Learning, e-Agriculture, e-Health, e-Banking) • Ethical, Cultural and Legal issues • Cyber security related issues (Hacking, Viruses, Plagiarism, digital ownership, data access rights, privacy, phishing, spoofing, eavesdropping, social engineering, denial of service (DoS), passwords-creation and bypass)	Acquisitive Organizational Communicative

<table>
<tr><td rowspan="4">Topic</td><td colspan="3">Value: The 21st Century is characterised by the generation, transmission, sharing and retrieval of information spanning all aspects of life. Information and Communication Technology (ICT) has been developed in order to coordinate and manage the information with the speed and accuracy that matches the pace of the activities across various fields of operations. The knowledge of ICT will not only help learners to cope with the current and future trends, but also position them strategically to contribute to the effectiveness of the systems for the betterment of humanity. Further, learners will be able to fix computer challenges that do not require high-tech.</td></tr>
<tr><td rowspan="3">Sub-topic</td><td rowspan="2">Learning Outcome</td><td colspan="2">Content</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>8.2.1.2.
Apply theoretical understanding of ICT Components, Roles, Tools and Concerns through practical</td><td>Application of theories of ICT Components, Roles, Tools and concerns such as;
Assemble and Disassemble computer hardware
Installation of Computer Software
Hardware configuration and boot order
Troubling and repairing computer peripherals
Creating bootable flash drive
Electronic services (e-Learning,
e-Agriculture, e-Health, e-banking)
Use of ICT tools (Mobile Phones, Video conferencing, software, television, laptops, radio)</td><td>Organizational Manipulative Communicative</td></tr>
<tr><td>8.2.1.3
Design products based on theoretical understanding of ICT Components, Roles, Tools and concerns</td><td>Products development such as:
Assembled computers
Hardware configuration
Troubleshooting and repairing computer peripherals
Software Installation
Creating bootable flash drive</td><td>Organizational Creative Manipulative Communicative</td></tr>
</table>

Topic	**Value:** *The vastness of data being generated requires organized capturing, packaging and quick retrieval for updating and referencing. Understanding the concepts of application packages will equip learners with innovative skills and competences to manipulate and create software which will be able to handle huge personal and networked data in many different forms for societal benefits.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
8.3 Application Packages	8.3.1 Word processing, spread sheets, presentation, data management and publishing	8.3.1.1 Demonstrate theoretically understanding of application packages	Theories of application packages software features, functions and tools such as: • Menu bar and developer menu • Design, Hyperlink, transitions and animations • Data management • Publishing	Acquisitive Manipulative Organizational
		8.3.1.2 Apply theoretical understanding of application packages software in practice	Application of theories of software application packages such as: • Articles and project reports • Data analysis and graphical representation • Presentation designs	Organizational Creative Manipulative Communication
		8.3.1.3 Design and develop products based on theoretical understanding of application packages software	Product development such as: • Alternative word processing • Inventory control systems • Presentation and Publishing applications	Organizational Creative Manipulative Communication

Grade 9 Computer Science	
General Outcomes	**Key Competences**
1. Demonstrate theoretical understanding of Computer Concepts, Introduction to Computer Programming, Database Management (SQL, Oracle) 2. Apply the theoretical understanding of Computer Concepts, Introduction to Computer Programming, Database Management (SQL, Oracle) 3. Design and develop products based on the theoretical understanding of Computer Concepts, Introduction to Computer Programming, Database Management (SQL, Oracle)	Demonstrate Scientific skills such as: • Acquisitive • Organizational • Manipulative • Creative • Communicative

Grade 9 Computer Science Syllabus Content

Topic	Value: *All computers depend on written programmes to function as they execute commands. Understanding the concepts of how computers function and execute commands will enable learners develop logical thinking and problem-solving through creation of software packages and applications that help computer users to meet their daily needs.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
9.1 Computer Concepts	9.1.1 Algorithms and Pseudo codes	9.1.1.1 Demonstrate theoretical and conceptual understanding of algorithms and pseudo codes	Understanding concepts of algorithms such as: • Variables a) Types of variables b) Assignment of the variables c) Temporary Variables • Expressions and Operators a) Numeric b) Alphanumeric c) Comparisons d) Reading function (input) and Displaying function(output) • Testing a) Structure of a test b) Conditions (if, if…else, switch) c) Nested ifs d) Go to (go to) • Loops a) Loops (for, while, do while) b) Iterative Loops c) Loops in Loops • Handling of tables in algorithms a) Use of the Tables in Algorithm b) Dynamic Tables c) Logical operators (AND, OR, NOT)	Acquisitive Organizational Communicative

Topic	**Value:** *All computers depend on written programmes to function as they execute commands.* *Understanding the concepts of how computers function and execute commands will enable learners develop logical thinking and problem-solving through creation of software packages and applications that help computer users to meet their daily needs.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
		9.1.1.2 Apply theoretical and conceptual understanding of algorithms and pseudo codes through practice	Application of concepts of algorithms and pseudo code such as; • Differentiating the container from the content; variable from the constant • Using truth tables to demonstrate logical operators • Using operators to write a pseudo code and flow chart • Writing algorithms using input and output functions in pseudo code and flow chart • Writing algorithms using tests in pseudo code and flow chart • Writing algorithm using loops in pseudo code and flow chart. • Drawing of flowchart with Tables • Writing algorithms with Tables in pseudo code and flow charts	Organizational Creative Manipulative Communicative
		9.1.1.3 Design and develop products based on theoretical and conceptual understanding of programming techniques	Product design and development such as: • Animated logic operators (e.g. security alert apps) • Functional loops	Organizational Creative Manipulative Communicative

Topic	**Value:** *Programming is the process of designing and developing an executable computer software package to accomplish a specific result. Through studying Programming, learners will develop logical thinking and problem-solving abilities thereby becoming orderly and patient through creation of software and applications that help users in daily life.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
9.2 Introduction to Computer Programming	9.2.1 Designing and writing programs	9.2.1.1 Demonstrate theoretical understanding of Program designing and writing	Theories of program designing and writing such as: • Declaring and use of variables and constants • Data structures • Basic data types (integers, Real char, strings and Booleans) • Conditional statements (Sequencing, Selection, Repetition) • Debugging of errors • Program execution • Text-based languages (SQL, JavaScript, PHP, Python, HTML, CSS) • Visual Basic Application Macros (Spread sheet formulae)	Acquisitive Organizational Communicative

Topic	**Value:** *Programming is the process of designing and developing an executable computer software package to accomplish a specific result. Through studying Programming, learners will develop logical thinking and problem-solving abilities thereby becoming orderly and patient through creation of software and applications that help users in daily life.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
		9.2.1.2 Apply theoretical understanding of designing and writing programs through practicals	Application of theories of designing and writing programs such as: • Mathematics calculations programs (i.e. totalling sum + number sum, • Counting i.e. Count + 1→ count) • Creation of web pages • Computer program (i.e. "STEM, Education!") program • Creation of data capturing forms • Game Applications • Mobile Applications	Creative Manipulative Communicative
		9.2.1.3 Designing and writing programs based on theoretical understanding of programming	Product development such as; • Computer program (i.e. "STEM Education!") program • Mathematics calculations programs • Data capturing forms • Office Software (Word processor, online sheets and presentation tools) • Web site • Assorted Robots	Organisational Creative Manipulative Communicative

Topic	**Value:** *In this information technology era, humans generate and gather enormous amounts of data which requires systematic organisation for easy handling. To achieve this, various Database Management Software such as SQL and Oracle are needed. Understanding domain specific languages helps learners to develop competences to generate, handle, manipulate, retrieve and analyse data for the benefit of all users.*			
	Sub-topic	**Learning Outcome**	**Content**	
			Knowledge	**Skills**
9.3 Database Management (SQL, Oracle)	9.3.1 Designing, Creating and manipulating of Databases	9.3.1.1 Demonstrate theoretical understanding of designing, creating and manipulating of Database	Theories of designing, creation and manipulating of SQL Database concepts such as: • Data Structures (Primitive and non-primitive) • Database creation • Design a database structure • Data types (Varchar, integer, text, Boolean, string, character) • Database organization (data manipulation) • Form design and Queries • And/or queries Junction Aggregation (average, count, minimum, maximum, sum) Tuples inserting. To remove and validate • Report generation	Acquisitive Organizational Manipulative Communicative

<table>
<tr><td>Topic</td><td colspan="3">Value: In this information technology era, humans generate and gather enormous amounts of data which requires systematic organisation for easy handling. To achieve this, various Database Management Software such as SQL and Oracle are needed. Understanding domain specific languages helps learners to develop competences to generate, handle, manipulate, retrieve and analyse data for the benefit of all users.</td></tr>
<tr><td rowspan="3"></td><td rowspan="2">Sub-topic</td><td rowspan="2">Learning Outcome</td><td colspan="2">Content</td></tr>
<tr><td>Knowledge</td><td>Skills</td></tr>
<tr><td>9.3.1.2
Apply theoretical understanding of designing, creating and manipulating of Database through practice</td><td>Application of theoretical understanding of designing, creating and manipulating of SQL and Oracle) Database such as:
Create a database
Data Manipulation
Create Queries using SQL statements (Select, Insert, Update and Delete)</td><td>Manipulative Creative Communicative</td></tr>
<tr><td>9.3.1.3
Design and develop products based on theoretical understanding of Database software</td><td>Product development in databases such as;
Stock Inventory Control
School Database
Cafeteria Menu
Library Management System Database
Production Unit Management System</td><td>Organizational Creative Manipulative Communicative</td></tr>
</table>

Appendix: Scope and Sequence

Grade 8		Grade 9	
Topic	**Sub-Topic**	**Topic**	**Sub-Topic**
8.1. Computer Science	8.1.1. Learning environment	9.1. Computer Concepts	9.1.1 Algorithms and Pseudo codes
8.2. Information and Communication Technology (ICT)	8.2.1 Word processing, spread sheets, presentation, data management and publishing	9.2 Introduction to Computer Programming	9.2.1 Designing and writing programs
8.3 Application Packages	8.3.1 Word processing, spread sheets, presentation, data management and publishing	9.3 Data Base Management (SQL, Oracle)	9.3.1 Designing, creating and manipulating of Databases

Time Allocation

There will be eight (8) periods of forty minutes each. This translates into 320 minutes per week**.**