BIOLOGY, CHEMISTRY AND PHYSICS

TEACHING SYLLABUSES

FIRST CYCLE: FORM 1 AND FORM 2

A guide for teachers

TABLE OF CONTENTS

1. GENERAL INTRODUCTION TO THE SCIENCE AND TECHNOLOGY PROGRAMME

1.1. Note to the reader

This guide is a presentation of the First Cycle Form 1 and Form 2 teaching programme of Science and Technology in the Anglophone sub-system of education in Cameroon. The guide describes the structure of the Science and Technology programme as well as its relationship with other learning areas, role of different stakeholders in the educational enterprise, competencies that a learner will acquire at the end of the course, programme matrix (life situations, competencies and resources), implementation techniques, assessment and expected outcome of the learner.

Science and Technology within the context of the Cameroon educational policy is made up of:

- Biology,
- Chemistry,
- Mathematics,
- Physics,
- Technology, and
- Computer Science

Only the syllabuses of Biology, Chemistry and Physics are treated in this guide. Those of the other subjects listed above are presented in separate documents. The First Cycle Form 1 and Form 2 programme covers the syllabuses of the first two years of secondary education. The programme is expected to be a link between the knowledge, know-how and attitudes acquired in the primary school on the one hand, and higher concepts and skills to be acquired subsequently.

The guide is prepared for those concerned with the initiation of the Cameroonian child into the basic concepts of Science and Technology in the beginning years of secondary education.

The training of the Cameroonian citizen in this learning area is intended to equip him/her with the relevant knowledge needed to understand and manage in a competent manner life challenges that affect him/her such as making informed decisions as well as foreseeing and making provisions for the future.

1.2. Aim of the programme

It has as main aim to inculcate in the learner responsible behaviour, knowledge and competencies, necessary for meeting with the challenges of the rapidly changing technological world.

1.3. Specific objectives

After completing this course the learner should be able to:

- explain natural phenomena;
- meet with the challenges of life, through the use of the scientific approach in problem-solving;
- acquire skills in team work, respect of oneself and the opinion of others;
- manage his/her environment in a sustainable manner;
- safeguard his/her health and that of all others in his/her surrounding;
- use process skills to acquire and apply knowledge;
- acquire life skills such as reading and implementing safety and security rules;
- communicate in a scientific manner with others;
- acquire skills in general scientific literacy, proper use and simple repairs of scientific and technological equipment and appliances;
- discover personal attributes and seek ways of enhancing them.

1.4. Why Science and Technology?

Most educators agree that academic success is measured in terms of what learners can do with their knowledge. The recall of facts is a lower order cognitive skill that requires amassing knowledge and only a minimum level of understanding, whereas critical thinking and the application of knowledge in problem-solving are higher-order cognitive skills that require deep conceptual understanding, application, analysis, synthesis and evaluation. Life problems are complex and complicated issues that require transversal or interdisciplinary competencies to handle. In a rapidly changing social, cultural, economic and technological world, transversal skills and competencies will not be acquired by mobilising resources through the teaching of isolated packages of skills and competencies in single subjects such as biology, chemistry, mathematics, physics, technology and computer science. When taught as single subjects, the learner lacks depth and mastery of the unifying concepts of the sciences and equally finds it difficult to integrate skills from the different subject areas in seeking solutions to daily life challenges. The complexities of life problems and the complexities of the solutions that must accompany them therefore require integrating skills and competencies from all the subject areas. This therefore calls for the teaching of the science subjects as an integrated package. Hence this explains the introduction of Science and Technology as a learning area which should pull together concepts, resources and skills in biology, chemistry, mathematics, physics, technology and computer science with the goal of developing appropriate competencies in the learner necessary for meeting with life challenges.

1.5. The legal/policy framework

Improving education through the development of competence, creativity and innovation in learners has been a high point on the political agenda in Cameroon since 1960. In 1995, this effort culminated into the National Forum on Education whose recommendations were later formulated into the Cameroon education policy statement (law no. 98/004 of 14 April 1998) to lay down guidelines for education in Cameroon. These guidelines prescribed that:

> *"The general purpose of education shall be to train children for their intellectual, physical, civic and moral development and their smooth integration into society bearing in mind the prevailing economic, socio-cultural, political and moral factors".*

The application instruments of the education policy framework of 1998 include amongst others:

> *Ministerial decision N° 49/06 of 08 February 2006 creating a commission charged with preparing texts of application of the 1998 orientation law of education.*

It is on the basis of these legal instruments that in 2006 work effectively started on the conception of the new curriculum which resulted in the present syllabuses.

The shift in emphasis prescribed by the national education policy requires refocusing, reorienting and restructuring of content and teaching to meet with the life challenges posed by a rapidly changing world. Hence the adoption of the Competency-Based Approach (CBA) in which the entry point is problem-based and centred around life situations. While content remains essentially the same with slight modifications to reduce bulk and irrelevance, the teaching approach is a total paradigm shift from earlier practices. This paradigm shift calls for continuous teacher professional development and retraining to meet up with the new challenges especially the enhancement of learner-centeredness. This in part explains the raison d'être of this guide.

2. RELATIONSHIP WITH OTHER AREAS OF LEARNING

2.1. With the Curriculum

Science and Technology is rapidly progressing and is omnipresent in human life. Against this background therefore, the teaching of basic Science and Technology concepts to learners in the First cycle Form One and Form Two becomes primordial. The role played by Science and Technology in our lives is constantly on the rise. The use of information and communication technology (ICT), mobile telephones, digital cameras, satellites, GPS, biogas, genetic engineering and genetically modified organisms, improved healthcare delivery systems, etc, are just a few of the many goods and services put at our disposal by Science and Technology . This explains why all over the world today the teaching of Science and Technology envisages enabling the learner to acquire a scientific and technological culture – a culture which enables him/her to read, understand and apply information and instructions on the proper use of equipment such as the computer, electric iron, coffee brewer, replacing a blown out electrical bulb, etc, as well as taking informed decisions on issues affecting his/her life and environment.

2.2. With other domains of learning

2.2.1. Language and Literature

As a means of communication, Language and Literature are closely interrelated with Science and Technology. A good scientist must be one who can communicate his/her ideas clearly, concisely and precisely. Both Language and Literature as a learning area on the one hand and Science and Technology as another learning area on the other hand all strive to inculcate the skills of effective communication in the learner. Science and Technology is studied using a language. Scientific concepts when expressed in bad language lose their meaning, are out of context and can lead to serious implementation errors and harm. Literature as a fine art shares a common relationship with Science and Technology since skills in ensuring precision about lengths, weights, sizes and shapes that are inseparable characteristics of the fine art come from Science and Technology.

2.2.2. Human and Social Sciences

Since the Social Sciences deal with issues associated with human societies and their works, they have a direct relationship with Science and Technology as they are concerned with the way human societies manage their environment and its resources to meet their needs and demands. Both areas of study call for critical observation of the environment past and present so as to build a model for the future and prepare the way forward for solving life problems.

2.2.3. Art and National Culture

Indigenous science and artistic productions such as craft works are cultural, artistic and traditional artefacts and values that require a high degree of scientific and technological accuracy and precision in their production. Additionally, a good knowledge of the basic physical and chemical properties of matter that are used in artistic productions is primordial to their durability and beauty. Substantial Cameroonian national riches like pharmaceutical plants are no longer known since the custodians of this knowledge - the patriarchs – have all passed on. A good mastery of the concepts of Science and Technology therefore will not only contribute to the valorisation of the Cameroonian traditional pharmacopeia, adding value to our artistic and cultural productions, but will also contribute to preserving and documenting them for posterity. In the light of the above facts Science and Technology is closely interrelated with Arts and the National Cultures.

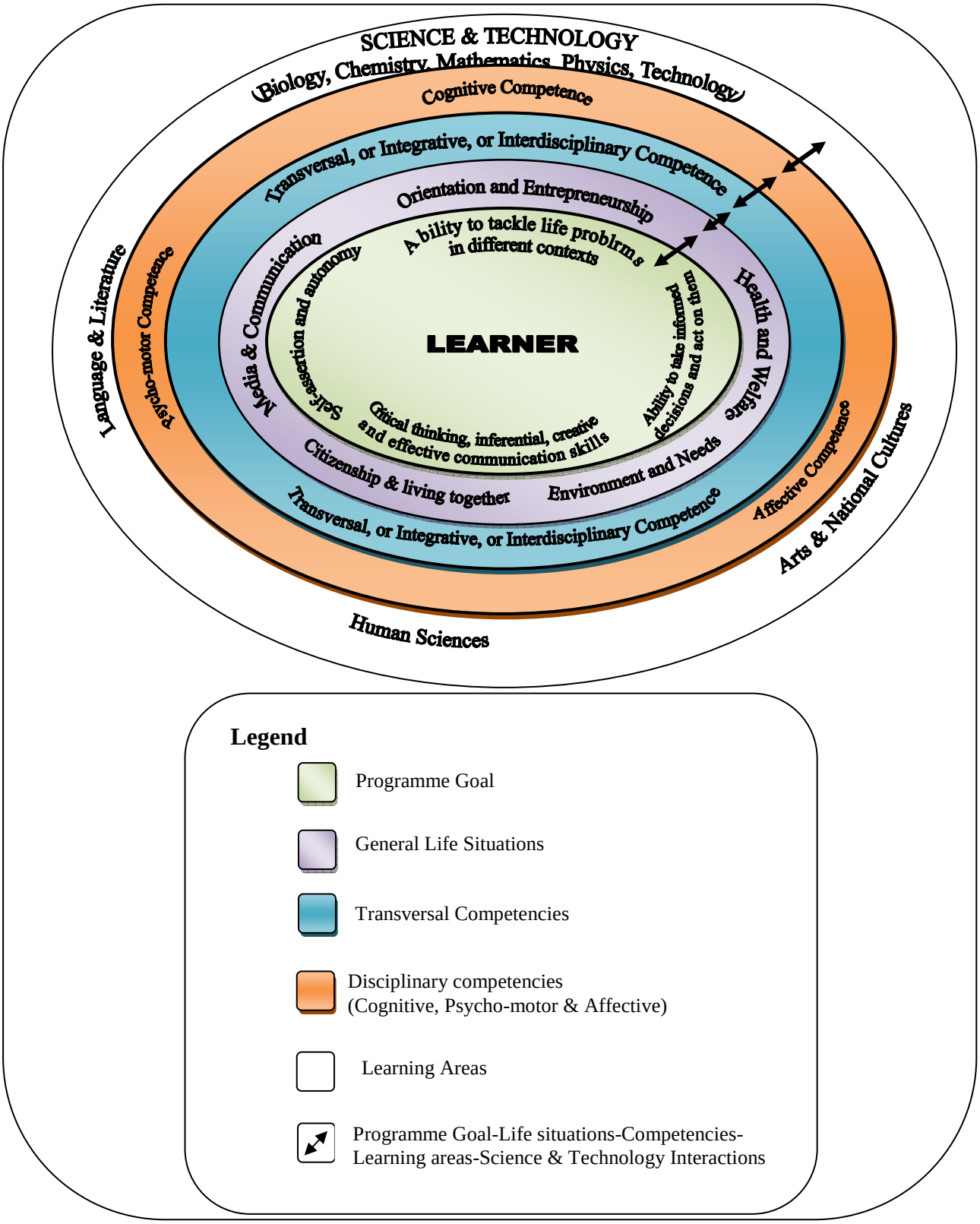

Figure 1: Interrelationship of Science and Technology with other learning areas, competencies, life situations and the programme goal

3. COMPETENCIES TO DEVELOP AND APPROPRIATE AT THIS LEVEL

The Form 1 and Form 2 programme for Science and Technology has been prepared based on competencies that students should acquire and appropriate at the end of the cycle. To guide the learner towards the acquisition and appropriation of these competencies, the competency level that the learner should acquire and appropriate in each class has been identified and organised. Accordingly the competency level that the learner should attain and the special learning outcomes required to achieve these are also included in the programme.

Competency which implies knowing how to act in the face of a specific problem or problems and in a particular context can be said to have four characteristics, namely:

- **competency is interventional (operational) and goal oriented:** it often always implies **action competence** – involving the ability to initiate action independently without being told or instructed to do so**;** it cannot therefore be dissociated from activity;
- **competency is contextual or structural:** it combines the **desire, possibility,** and **ability** to act in a particular context that is well defined; it is linked to a specific life situation or situation-of-use and therefore has a context;
- **competency is learned or acquired:** a person becomes competent through personal and social interactions and constructions; nobody is borne competent;
- **competency is abstract and hypothetical:** only the manifestations and consequences of competency can be observed; competence in the real sense of the word cannot be observed.

3.1. Core competencies for lifelong learning

The present Science and Technology programme for the Form 1and Form 2 defines core competencies and describes the essential knowledge, aptitudes and attitudes linked to each type of competence. These key competencies include:

- **Critical thinking, inferential and creative skills and the spirit of initiative and enterprise**: This consists of the capacity to transform ideas into action. It calls for the development of the intellectual or cognitive, affective and psychomotor capacities of the learner. It presupposes creativity, innovation and risk taking. It deals with problem analyses, the ability to plan, programme and management projects with the vision of realising the objectives of such projects. This type of competence is the foundation for the acquisition and appropriation of specific knowledge, methodologies, skills, aptitudes and attitudes generally needed by those who create and innovate. It requires the appropriation of the values of ethics and good governance, identification of needs and the definition of values.
- **Communicating effectively:**
  This is the faculty to express scientific and technological knowledge, information, concepts and understandings in a clear, concise and precise manner for easy understanding. This uses symbols and could be written, oral or visual. This competence calls for the development of the cognitive and affective capacities of the learner. It also implies the effective and correct use of appropriate scientific and technological terminologies in interpreting and communicating ideas, thoughts, sentiments, and facts, as well as opinions in an oral or written form. It presupposes the acquisition, mastery and appropriation of effective listening, reading, writing and motivational speaking skills. It equally calls for appropriate and creative linguistic interactions in all the scientific, technological, cultural and social situations of life.
- **Taking informed decisions, acting on them and tackling life problems in different contexts:**
  This is the ability to act on the strength of a set of information and in a defined context to improve or solve a problem. It calls for the development of the cognitive, affective and psychomotor capacities of the learner. It presupposes the ability to think critically, inferentially,

creatively, analyse, synthesise and apply knowledge and methods in seeking solutions to problems or improving a problem situation. It calls for an answer to the question: *"What can learners do with their school knowledge"?*

- **The scientific spirit and culture:**
  This is the faculty to observe phenomena, analyse problems, and emit hypotheses to explain their possible happenings, causes, and consequences. It involves experimentation from whose results the hypotheses can be upheld or refuted and from which conclusions are drawn. It calls for the development of the cognitive and psychomotor capacities of the learner. Above all this competence implies the respect of ethical principles and the opinion of others.
- **Mathematical, technological and numeracy skills:**
  Mathematical and numeracy skills constitute a basic skill in Science and Technology. It is the aptitude to develop and apply mathematical and numeracy skills to seek solutions to, or improve a daily life problem or situation with emphasis on logical, rational and deductive reasoning, precision, concision, activity, knowledge and procedures. It presupposes changes linked to human activities, individual responsibilities as citizens, accuracy and precision in the usage of scientific and technological tools as well as information and communication technology (ICT).
- **Self assertion, autonomy, social and civic skills:**
  This is the capacity to organise and assert oneself or take up a position in a group depending on one's needs and values. It calls for the development of the cognitive, affective and psychomotor faculties of the learner. It implies the acquisition and appropriation of personal, interpersonal and intercultural skills as well as all the different forms of behaviour that an individual adopts to contribute effectively, efficiently and constructively to social and cultural life. Essential to this competence is the acquisition, understanding and usage of the codes of conduct in the different environments in which the learner evolves.

These core competencies are **interdependent** on one another and for each of them emphasis should be placed on critical thinking, creativity, initiative, innovation, problem-solving, risk analysis and evaluation, taking informed decisions and the constructive management of sentiments and feelings.

3.2. Transversal and disciplinary competencies

A transversal (interdisciplinary, horizontal or integrative) competence is cross cutting and is developed by mobilising resources from several related subjects or learning areas or domains. The key competencies summarised above in section 3.1 are essentially transversal in nature. This is because each subject that makes up the Science and Technology programme of the Form 1 and Form 2 contributes its own quota in the development of the competencies needed to solve or improve complex life situations.

A disciplinary or vertical competence is subject-specific. For example, preventing a fracture will require skills in biology on the anatomy and physiology of bones. However treating a fracture may call for transversal skills in biology (anatomy and physiology of bones); chemistry (bone composition, chemical substances and bone regeneration process); and physics (keeping the broken bones in place by the use of splints, etc).

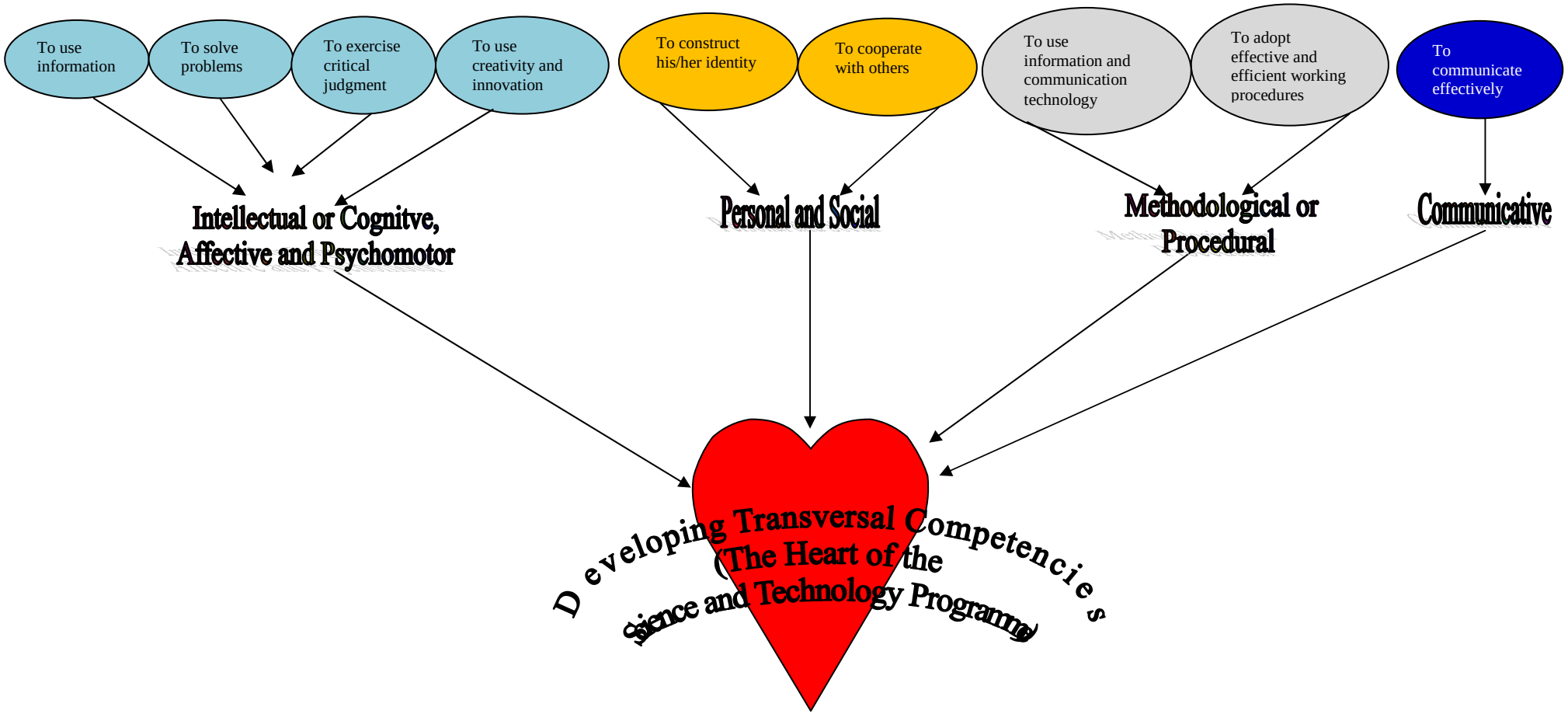

Figure 2: Science and Technology Competencies to appropriate at the end of the First cycle Form One and Form Two

4. ROLE OF EDUCATION STAKEHOLDERS IN THE IMPLEMENTATION OF THE COMPETENCY-BASED APPROACH

The education stakeholders in this guide refer to the teacher, the learner, the parent and members of the wider community. These major actors must work in synergy to deliver education in order to produce the type of citizen prescribed in the 1998 orientation law.

4.1. Role of the teacher in facilitating learning

Before the advent of Western Education in Cameroon, every adult member of the society served as a teacher and initiated the young ones into the trade, culture, norms, ethics and beliefs of the society. In actual fact, if a father was a good palm wine taper, the son would automatically become one, and if a mother was a good basket weaver, the daughter would become one. Therefore the typical Cameroonian or more generally the African traditional education was based on the appropriation of specific skills in order to integrate into society as a responsible member of that society. This is outcome or competency-based education. This type of education took place in the homes and the community with no formal school structures and certification. In Cameroon today, a teacher is a person who has undergone approved professional training in education. Such a professional teacher is capable of imparting knowledge, right attitudes and skills to learners. Against this background, teaching is defined as a systematic process of transmitting knowledge, attitudes and skills in accordance with professional principles. Teachers in Cameroon secondary schools to date have been doing just this.

The restructuring of the secondary school sector and its syllabuses coupled with the prescription of competency as the ultimate outcome of learning calls for a drastic change in classroom practices. The teacher is called upon to facilitate learning and not transmit knowledge. Additionally, the teacher is also called upon to facilitate the appropriation of knowledge by the learner for meeting the challenges of life. Facilitation requires skills and its underlying belief is that only the learner can learn. Finding ways to interest the learner and get him/her actively involved in learning is paramount.

The teacher is very important through his/her influence, character and example. The learner is his/her responsibility. The teacher needs perseverance, high ideals and a desire to give time, energy, thought and cares to his/her work. The teacher as a facilitator or a companion should therefore be someone who has changed from the conventional information holder and giver to one who stimulates/accompany the learner to:

- actively contribute to creating his/her own knowledge;
- develop his/her own understanding of issues; and
- appropriate and apply the knowledge and understanding to attain his/her own goal and dreams or seek solutions to life problems and challenges.

The concept of facilitation in teaching is based on the fact that the learner is not a “tabula rasa” (clean slate) on which the presumed all-knowing teacher writes knowledge. The learner comes to school already knowing something from his/her interaction with his/her environment. The role of the teacher therefore is to help the learner confront his/her preconceptions with scientific knowledge through the use of carefully designed activities that would fully involve the learner in the process. The process of facilitation involves encouraging the group to develop and grow by creating opportunities for members to explore their environment, question how and why things are

happening, what can be done about them, and to learn from one another through the sharing of experiences.
The teacher as a good facilitator therefore is expected to:

- create an atmosphere of friendliness and equality;
- stimulate learners to reflect on issues and problems and seek solutions through carefully designed activities;
- give opportunities to all learners, encouraging those who are not used to speaking in a group to participate;
- prepare enjoyable, interesting, and exciting activities well in advance to fully involve the learner in the creation of his/her own knowledge;
- manage time properly;
- encourage creativity and critical thinking;
- respect the opinions of others especially the learner;
- use visual aids when and where necessary;
- lead debates, discussions, plenary exchanges and analyses by raising probing questions;
- monitor, evaluate and summarise ideas raised by the learner;
- evaluate evidence of learning to contribute to profiles and report on learners' achievements and progress;
- be clear in purpose and task and always check to be sure that the learner understands what he/she is expected to do,
- be sensitive to the needs of the learners during activity;
- be flexible, modest and non-judgmental.

4.2. Role of the learner

The role of the learner is to learn. The teacher cannot learn for the learner. By allocating appropriate time to his/her school work and by making an effort to learn, the learner would realise progress and the development of his/her skills, which in turn would motivate further learning. Learning, taking responsibility and being the architect of one's success must be the regular companion of the learner.
The learner must take all the opportunities at his/her disposal, in and out of the classroom to deepen his/her knowledge, skills and competencies of the world that surrounds and enriches his/her scientific and technological culture. In other words, it is important that the learner amongst others should:

- become actively involved in his/her own learning;
- put in all the efforts necessary and understand that patience and perseverance are inseparable from learning;
- cultivate the spirit of team work and respect the opinion of others;
- shape and review his/her learning by reflection, setting learning goals and next steps including personal learning plans;
- review his/her own learning through self assessment;
- collaborate in peer learning and assessment.

4.3. Role of the parents

The role of parents in the education of their children is to support teachers and to work in synergy with the school authorities to foster their education. This role revolves around the following themes:

- accompanying the children in their learning ;
- making the home a comfortable learning place ;
- making the home a crucible for culture incubation, and social interaction.

4.3.1. Accompanying the children in their learning

Parents can help their children to develop interest in Science and Technology, by reading together with them newspaper publications on Science and Technology and watching scientific and technological documentaries and movies with them, etc. They can also cultivate in their children the habit of respect for the environment, such as:

- never leaving the tap(s) running when water is not being collected for use;
- never littering;
- sorting waste before disposing of them;
- switching off light when not in use;
- switching off the TV or musical set when no one is watching or listening;

Parents can also manifest interest in their children's learning by finding out what they learned in school each day or each week, so as to better help them improve. Parents are called upon to encourage their children to do their assignments, and help them develop a study timetable with enough time for rest and recreation to ensure effective use of time. They are also required to supervise the effective use of such timetables. To achieve all of these the parent must have a sound understanding and mastery of the curriculum of the class as well as that of the previous class and the next, to ensure relevance of support, and to better appreciate the type and level of competencies expected of their children.

4.3.2. Making the home a comfortable learning place

In supporting teachers and working in synergy with the school authorities, parents ought to provide appropriate learning places in their homes for the children. Such places should be properly lit, ventilated and have appropriate sitting and writing equipment. They also should provide carefully selected and relevant didactic materials and tools such as wall charts, games, pictures, books, chalkboard, etc to stimulate curiosity in the children in exploring the applications of Science and Technology concepts. They should ensure that the children eat regular and balanced meals to nourish their intellect and provide the energy necessary for concentrating on their learning. Parents must motivate their children when they do well and encourage them to work harder when they are not doing well. In accompanying the children in their learning, parents must keep an eye and an ear out for good language – English, as this is the vehicle through which knowledge, skills and competencies in any learning area are acquired.

4.3.3. Making the home a crucible for culture incubation, and social interaction

Teaching the children indigenous scientific and technological knowledge and techniques such as weaving, cooking, traditional medicine, craft and art works through the use of traditional languages, riddles and jokes, storytelling, singing, dance drama, etc will contextualise the learning of Science and Technology at school and further enhance their competencies. Letting children participate in family discussions, prayers, eating together with all members of the family and friends at table, etc, will cultivate social interaction skills needed for team work, corporative and peer learning and the

respect of the opinions of others. Parents must advise their children to shun disruptive friends and behaviour, irresponsible sexual behaviour, alcoholism, cigarette smoking and drug addiction. Sex and alcohol can wait, but life and education do not wait for anybody.

4.4. Role of the community

By community here this guide refers to educational stakeholders such as government, local administrative authorities, school management boards, Parent-Teacher Associations (PTA) and private educational providers. The community constitutes the next larger environment of the learner after the home. The role of the community in enhancing the education of the child constitutes her obligations towards, the learner, teacher, school administration and infrastructure or learning space. In other words it involves the provision of an appropriate learning environment that inspires learners to dream big. Environments that provide experience, stimulate the senses, encourage the exchange of information, and offer opportunities for rehearsal, feedback, application, and transfer are most likely to support learning. Some of the responsibilities of the community in the education of the child are thus summarised below:

- provision of opportunities for teachers to work collaboratively in planning the curriculum, learning, teaching and assessment in a coherent way to achieve breadth, overcome challenges and facilitate the application of knowledge;
- provision of opportunities for teachers to discuss, share and develop an understanding of standards and expectations through participating in seminars and in-service-training in CBA teaching and assessment;
- keeping an appropriate focus on coherent planning, checking, sampling, reviewing and providing feedback for improvement;
- ensuring appropriate monitoring and tracking of learners' progress so that assessment information is used to support learning and involve learners in target setting;
- using curriculum for excellence guidance in self-evaluation and ensuring it is reflected as a key priority in all improvement plans;
- ensuring that self-evaluation is based on a wide range of evidence across all aspects of learning;
- ensuring regular monitoring and evaluation of the school system and the reinvestment of such evaluation results for improvement on the consistency of learning, teaching, assessment and achievement within the school system.

5. METHODOLOGY

Effective preparing and teaching of a good lesson require first hand mastery and understanding of the syllabus. It should be noted that the syllabus in any subject area is just a blueprint (guideline) of what to teach. This means that in teaching the details of the guideline have to be furnished by the teacher through his/her creativity and resourcefulness. The teacher is therefore called upon to read full meaning into the syllabus and not take it from its bare face literal context. For this reason, this section of the guide will start by introducing the programme matrix which is a concise explanation of the structure of the syllabuses in this programme.

5.1. Programme matrix

The syllabuses for each subject that make up the Science and Technology programme are drawn to meet life situations. Organised around learner activities the programme seeks to implement government policy, aims and objectives of education.

The First Cycle Form 1 and Form 2 programme for Science and Technology is divided into six modules.

The programme matrix is a table made up of three major columns:

The first column is the **Contextual Framework** which is sub-divided into **families of situations** and examples of **real life situations** where the knowledge and skills (competencies) can be applied. A life situation is contextual (in context) if it is:

- truthful or real;
- true to the learner ;
- related to the competence to be developed
- related to the real life situation of the learner (his /her country, town, village, quarter, school, home, relations, health, social problems, etc….).

The second column is the **Competencies,** made up of *categories of actions* and *examples of actions*. These are groups of some actions which are related to the mastery of the competencies expected for each module. It should be noted that the families of situations and their examples as well as the categories of actions and examples are not an exhaustive list but simply indications to guide the teacher in the implementation of the syllabuses.

The third column is the **Resources** and consists of the *essential or core knowledge* which gives all the set of intellectual or cognitive, affective and psychomotor resources which the learner has to mobilise in order to successfully treat a family of situations. It is divided into four components namely:

- the *subject content* (Essential knowledge)*;*
- the *aptitude* (skills or know-how);
- *attitudes* (practice); and
- *other resources* (human, material, financial, etc.) necessary for the acquisition of the competencies. Table 1, illustrates these.

Table 1: Programme matrix

CONTEXTUAL FRAMEWORK		COMPETENCIES		RESOURCES			
Families of situations	**Examples of situations**	**Categories of actions**	**Examples of actions**	**Essential knowledge**	**Aptitude**	**Attitude**	**Other resources**

5.2. Creative teaching

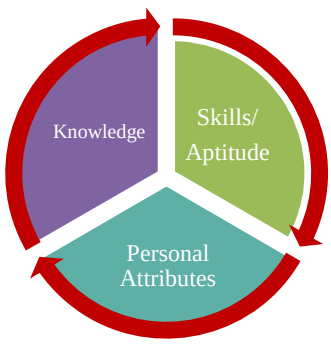

Figure 3: Knowledge, aptitude and personal attributes

At the heart of the competency-based approach is the ability to initiate action to bring about change independently without doing so as an instruction or an academic exercise. To achieve this calls for the use of a combination of teaching techniques that will inspire effective participation, critical thinking, creativity, initiative, team spirit, and innovation in the learner. These techniques offer the opportunity to the learner to learn by doing and receives it in three components namely knowledge, personal attributes and, skills/aptitude.

For these techniques to be effective the teacher must divorce from the traditional talk and chalk approach. Such creative, experiential and exploratory teaching techniques are learner empowering tools and include amongst others are:

- the scientific approach;
- problem-based learning;
- group work and plenary discussions;
- brainstorming;
- picture games;
- role play;
- simulation;
- sketches;
- dance drama;
- debates; etc.

Using these techniques require detailed planning well ahead of time, practice, patience and perseverance.

5.2.1. An example of a creative teaching method – the scientific method or inquiry teaching

The scientific approach is the process of scientific inquiry which is based on observation, questioning, predicting, investigating, interpreting results and confirming or rejecting the prediction.

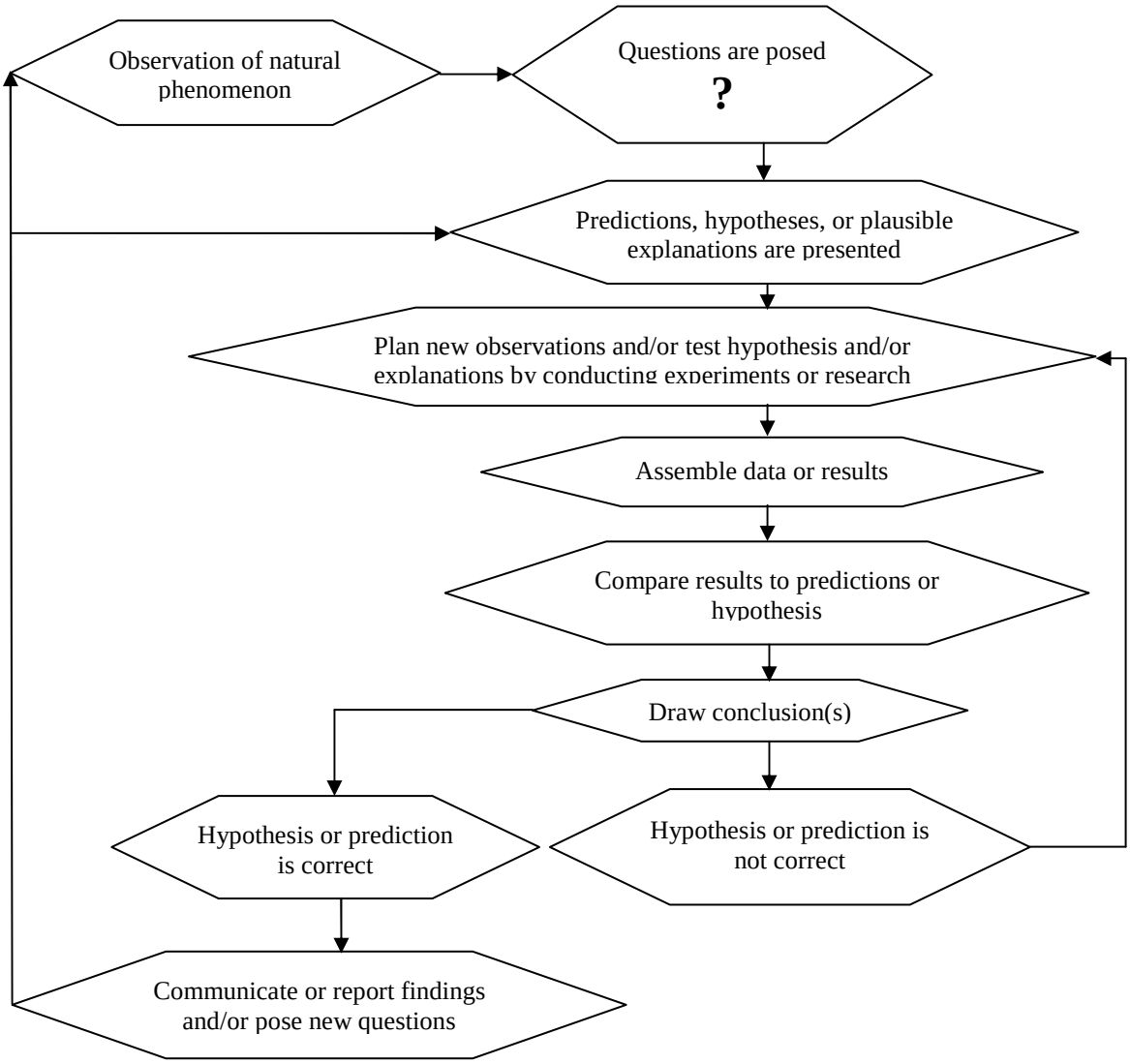

Figure 4: The process of scientific inquiry/Inquiry teaching

It should be noted that through this method all the core competencies and skills can be thought, such as critical and inferential thinking, problem-solving, creativity, innovation, effective communication, building team spirit, respect of the opinions of others, and assertion, etc.

People unconsciously use this approach everyday in problem-solving. For example:

- A person gets up in the morning and the car cannot start. This is an observation.
- He/she proceeds by asking the question: Why is the car not starting? What could be the cause(s)? This is the question.
- He/she now predicts or suspects a possible reason for the car not starting such as: the ignition plug is blown; no fuel; electrical connectivity problem, etc. This is the hypothesis or possible explanation of the cause of the car not starting.
- He/she proceeds by changing the plugs (experimentation or testing of the hypothesis or prediction or suspected explanation of the problem).
- The car starts or does not start – This is the result
- If the car starts, then he/she concludes that the problem was the bad spark plug.
- If the car does not start, he/she follows the same process to investigate the next hypothesis and so on until the problem is solved.

Hence the scientific process is a systematic way of diagnosing, analysing and seeking solutions to problems from which new knowledge can be generated or already know facts confirmed. It is an iterative process from which results may feed back into the process to generate further observation, hypothesising and experimentation. This method of inquiry may not only be used in a conventional laboratory setting. It can be used inside as well as outside the classroom. All that is required is the teacher's ingenuity and effective planning. All research and experimentation follow the scientific method of inquiry.

5.2.2. Preparing a competency-based lesson in Science and Technology

A competency-based lesson consists of helping the learner develop competencies that can enable him/her to solve or improve on a life problem in context. The approach involves entering the lesson through a real life or contextual problem or issue.

The main steps involve:

i. At the start of the teaching/learning action, the teacher is expected to sign a pedagogic contract with his/her learners and this includes amongst others:
   - participatory development of roles on how the classes will function as well as roles of discipline;
   - assess participant's needs with respect to the realities of their local environments so as to build them into the lessons where and when appropriate;
   - explaining the structure and content of the syllabus to the learners, clarifying any aspects of doubts;
   - specifying the goal and objectives of the syllabus as well as the expected outcome of the learner at the end of the course;
   - specifying and clarifying the responsibilities of the learners;
   - clarifying how and when competencies will be assessed.

ii. Identifying the problem or real life situation with respect to the lesson to be taught with concrete examples in the learner's immediate environment.

iii. Next identify the possible causes of the problem(s).

iv. Make a list of all the possible actions needed to solve or improve the problem situation.

v. List all the possible resources needed in undertaking the action(s). This constitutes all the possible types of internal resources (knowledge, aptitude and attitude) and external resources (human, material, financial etc).

vi. Identify or define the competence or competencies to develop in the learner that will help him/her effectively improve or solve the identified problem.
There are four fundamental elements to consider in identifying the type of competence to develop in the learner and a list of some stems in the phrases to use when stating a competence(ies) as in Table 2.

Table 2: Stems of conditions, tasks and resources for defining operational competency statements

Condition	Task	Resources
From…	The learner will be capable of…	With reference to…
Given that…	The learner should be capable of…	By making use of…
Either…	The learner can…	By putting into place…
By making use of…		In coherence with the criteria of…

Stating the competence to be developed

In stating the competence to develop, the **condition** (From...; Given that...; Either...; By making use of...); the **task** (The learner will be capable of...; The learner should be capable of...; The learner can...); and the **resources** (With reference to...; Using...; Putting in place...; In coherence with...); are specified. In addition to specifying these elements, the competency statement must be written in **appropriate scientific language and terminologies**.

5.2.3. Delivering a competency-based lesson

Delivering a competency-based lesson requires careful and meticulous development of the identified resources. This follows the normal process of a lesson which includes:

- The stages (introduction, body, conclusion) – in rows;
- The intermediate learning objectives, pedagogic activities, content, didactic materials, evaluation and timing in columns.

The introduction begins with assessing the learner's needs with respect to the competencies to develop or a test of assumed previous knowledge. This is followed by an introduction of the problem which is contextual. This could be by use of pictures, diagrams, stories, life specimens, observation of natural phenomena, etc. The problem-based approach in itself is a strong motivating factor and serves as the rationale of the lesson.

5.2.4. Designing the integration or reinvestment activity(ies)

An integration activity aims to teach the learner how to mobilise his/her resources to solve a problem situation. It requires pulling together the different aspects of the resources into a whole with the goal of improving on the identified life situation. It can be used at any time in the learning cycle, but most often it is better after a series of lessons that constitute a topic or theme. It must take into consideration all the resources and lessons linked to a problem situation for which a

competence or competencies are developed. To conceive an integration activity one must take into consideration:

- the problem situation to be resolved;
- the tasks to be realised by the learner;
- complementary information for the realisation of the tasks;
- the constraints for the realisation of the task; and
- the use of appropriate scientific terminology/method (qualitative criteria)

5.2.5. Sample lesson plans

The sample lesson plans presented in this guide are intended to inspire the teacher to be able to exploit them in their individual subjects to prepare CBA lessons based on the content of the syllabuses. They are not a standard and teachers are therefore encouraged to adapt and modify them as the need may arise. They however serve as a useful framework within which teachers can organise their teaching-learning actions.

MODEL LESSON PLAN: BIOLOGY

NAME OF TEACHER:		**CYCLE:** **:**		
SCHOOL:	**CLASS:**	**DATE:**		
SUBJECT: Biology	**TIME:** 50 minutes	**TOTAL ON ROLL:**	**BOYS:**	**GIRLS:**
MODULE: Environmental education and sustainable development				
FAMILY OF LIFE SITUATIONS: Sustainable management of natural resources (water)				
EXAMPLE OF LIFE SITUATION: Pollution (contamination) of water sources from irresponsible waste and refuse disposal				
RATIONALE: *Students and neighbours have the habit of dumping refuse into Nchogha'a stream near GHS Mbafou – the only source of drinking water for them; and in this community there has been an increasing occurrence of dysentery and typhoid cases. Therefore the student can educate and raise awareness amongst their peers and the wider community on the need to stop further pollution of the stream given the appropriate resources by using educative talks, clean-up campaigns, advocacy and the writing of public notices and warnings.*				
COMPETENCIES TO DEVELOP: the spirit of initiative and enterprise; team spirit and effective communication skills; ability to take informed decisions, and act on them; the scientific spirit and culture.				
RESOURCES TO DEVELOP: Water pollution: Pollutants, sources, causes of pollution; consequences on health/wellbeing of living things; prevention.				
Integration activity: (1) Action plan for educating/sensitising or raising awareness on the need to safe our water sources. (2) Advocacy message and action plan for effective implementation of the natural resources conservation law on defaulters. (3) Action plan for a clean-up campaign of a polluted water body in your community. (4) Student project: Adopt a river or stream or any other water body in your community and clean and/or safe it from pollution.				
LESSONS: 1. Pollutants, types, sources and causes. 2. Consequences and prevention of water pollution 3. Preparing education and sensitisation or awareness messages; effective communication and awareness raising; preparing advocacy messages; designing projects to solve a problem or improve on a deteriorating situation.				
ASSUMED PREVIOUS KNOWLEDGE: students can state the importance of water to living organisms.				
DIDACTIC MATERIALS: 1. Water. 2. Pictures showing water pollution in the community where the school is found; 3. Unlabeled chart of different ways of usage of a river (people bathing, washing dresses, defaecating, dumping refuse upstream); others collecting drinking water downstream; picture or drawing of people suffering from cholera, diarrhoea, dysentery, etc.				
REFERENCES: Margaret Besong, Wilfred Mbacham, George Nditafon (2003). *New Science for Cameroon: Biology book I,* Macmillan, Hong Kong. Living Earth Foundation Cameroon Programme (2006). *Delivering environmental education – a guide for teachers,* Ed Graphics, Yaoundé.				

STAGE	ILO	PEDAGIGIC ACTION	CONTENT	DIDACTIC MATERIAL	EVAL OF RESOURCES	DUR.	INTEGRATION ACTIVITY
INTRODUCTION	1. To test assumed previous knowledge. 2. To contextualise the situation, identify and state the life problem. 3. To state the title and objectives of the lesson.	Teacher presents water and ask students question(s) and learners respond Teacher presents chart or picture and ask students to observe and identify the message in it Teacher draws on identified problem to state the objectives of the lesson.	Uses of water to living organisms: Constituent of all cells; transport; reproduction; digestion; excretion; photosynthesis; temperature regulation; growth; cooking; drinking; washing; manufacture of articles; etc. Pollution of water body by: Household wastes; human wastes; sewage; human activity; etc. **Title** – Water pollution: • Sources and causes. • Consequences on human, animal and plant health. **Aim** – Mobilisation of resources to prevent water pollution and/or clean a polluted stream.	Water Picture; chart	1. List 5 ways in which water is important to living organisms 2. Name three ways you use water in your home. 3. Describe what you see in the picture or chart. 4. Name a place in the community, village, town, etc, which you can identify with the picture or chart. 5. State the problem(s) that you can identify in the picture or chart.	7 Mins.	To come at the end of the three lessons as in this case.
BODY	1. To define some key terms used with respect to natural resources management	Teacher presents picture/chart and ask students to name the different substances they can see.	**Definitions of key terms:** **1.** Pollutant **2.** Pollution **3.** Waste **4.** Refuse **5.** Sewage	Picture/chart	1. Define with an example each of the following terms: a. Pollutant b. Pollution c. Refuse	5 Mins.	
	2. To identify: a. water pollutants in the locality and classify them;	Teacher organises students into groups and provide clear instructions on what has to be done (see sample instruction and worksheet attached). Students work in groups to complete activity and share their findings in plenary	**Types of pollutants** Solid, liquid and gaseous pollutants • Refuse • Human wastes • Sewage • Chemical substances	Picture Chart	1. Name the three main classes of water pollutants. 2. Classify the following pollutants as solid, liquid or gas: Plastic paper, Plastic bottles, Broken bottles, Torn clothes, Cartons, Urine, Faeces, Oxygen, Waste water, Heat, Food peelings, etc.		

BODY	b. sources of pollutant;		**Sources of water pollution** • Homes • Industry **Causes** • Lack of knowledge of usefulness of water to living organisms • Lack of knowledge of consequences on health/wellbeing • Habit of considering water bodies as receptacle for wastes • Lack of knowledge of the law on environment natural resources conservation.	Picture Chart	3. Name the three main classes of water pollutants. 4. Classify the following pollutants as solid, liquid or gas: Plastic paper, Plastic bottles, Broken bottles, Torn clothes, Cartons, Urine, Faeces, Oxygen, Waste water, Heat, Food peelings, etc. 5. Name two important sources of pollution. 6. Give three possible reasons why we pollute our water sources.	25 Mins.	To come at the end of the three lessons as in this case.
CONCLUSION	To consolidate the resources mobilised To prepare next lesson To check attendance/complete record of work book	Teacher asks students to list what they learned from the lesson. Teacher gives assignment based on the objectives of the next lesson Teacher conducts roll call, and note absences/complete logbook	• The role of water in human life • The concept of pollution • Human habit and behaviour consequences 1. Describe how you dispose of the refuse from your kitchen. 2. Where do you dispose of your waste water? 3. What can be done to stop further pollution of our rivers, streams, etc?			5 Mins 4 Mins 4 Mins.	

SAMPLE WORKSHEET

Learning activity

Group work

Purpose: To identify and classify types of water pollutants; their origins; causes

Skills to develop: Team spirit, sharing of ideas, respect for oneself and the opinions of others, respect of rules, taking of responsibility, self-assertion, brainstorming, critical thinking and effective communication.

Materials: 7 to 8 pictures or charts. **Note:** The number should be equal to the number of groups you intend to constitute.

Preparation:

1. Cut each picture/chart into 5, 6, 7, or 8 pieces, each. Ideally, 8 pieces should be the maximum as cutting the pictures into more than this would render rebuilding difficult and time consuming. The number of pieces of each picture/chart is the number of students per group. **Note:** This is done well before the lesson to save time.
2. Put the pictures into a carton or box or basket and mix them up.

Instructions to students:

1. Take a piece of the picture/chart and pass on the rest. Do not take more than a single piece. Each piece is part of a whole, picture/chart. The whole picture/chart is made up of 5, 6, 7, or 8 pieces. Please specify the exact number of pieces that make up a complete picture/chart.
2. Move round and find the corresponding pieces of your picture/chart.
3. Members of each completely constituted picture/chart form a group.
4. In your groups, choose a **leader to coordinate the discussion**, **a time keeper to ensure the respect of time, and a secretary to write down your points**.

Note: Implementing instructions 1through 4 should not take more than **3 – 5 minutes!**

Work to be done by each group: (10 Minutes)

Study your picture/chart carefully and respond to instructions that follow:

1. In your groups write down the problem presented by the picture/chart.
2. Name a river, stream or body of water in your community or nearby community or town you know where you can see this type of problem.
3. Make a table of three substances and their sources or origins that you find in the water body that you think should not have been there.
4. Identify one substance that could have come from your kitchen or that of any other member of the group. Suggest a general word used to describe household waste.
5. Write down one reason why you think that people discharge their wastes into water.
6. At the end of the activity, group leaders, secretaries, time keepers or volunteers present their findings to the class and this is accompanied by discussion with the teacher refocusing the discussion or debate.

Together with the students, key learning points are summarised and learners take them down.

Integration activity: To come at the end of the three lessons. This should aim to evaluate the application of school knowledge to solve a real problem in the community.

Picture for lesson 1

MODEL LESSON PLAN: CHEMISTRY

Name of Teacher:			
School:	**Class:** Form 1	**Date:**	
Subject: Chemistry	**Time:** 50 minutes	**No on Roll:**	
Title of Lesson: Experiment to demonstrate that air is made up of active and inactive parts and to determine the percentage composition of the active part.	**Topic**: Air **Sub-topic:** Active part of air	**Didactic material:** -Chalk board, candle, plastic lid, beakers, water, box of matches, ruler.	**Didactic support:** Worksheet
Objectives: At the end of the lesson students should be able to; -carry out an experiment to show that air is made up of active and inactive parts. -identify the active part of air. -determine the percentage composition of the active part of air.			
Previous knowledge: Students can define air and give the composition of air.			
Bibliography(References): -New Science for Cameroon: Chemistry Book I, by Emilia Ndinteh -New College Chemistry			

Stages	Objectives	Content (Subject Matter)	Teacher's Activities	Students' Activities	Materials	Evaluation	Time
Introduction	- Briefly review the last lesson. -Introduce the new lesson.	Brief review of previous lesson by asking a few key questions.	-Teacher asks questions to students. -Teacher points at students to answer the questions.	Students answer the questions asked.		-What is air? -Give the composition of air. - etc.	5 mins
Presentation	-Students carry out the experiment in groups. -Students	**Requirements** Candle, plastic lid, two beakers, water, box of matches, ruler. **Procedure** -Melt the base of the	-Teacher distributes the material to groups of students. -Teacher distributes the worksheets; one to each group.	-Students collect the material from the teacher. -Students collect the work sheet from the	-Worksheet, candle stuck to a plastic lid, beaker with water, empty smaller beaker, box of matches, ruler.	-What is the height of the second or smaller beaker? -What happens to the level of water in the covered beaker?	35 mins

	discover and explain why/how air is made up of active and inactive parts.	candle and attach it to the plastic lid. -Float the candle and plastic lid in a beaker of water. -Cover the candle and lid with another beaker. -Remove the beaker and light the candle -Cover the candle again with the same beaker and observe. **Observations** **Conclusion** (See below)	-Teacher guides the students to carry out the experiment. -Teacher gives enough time to the groups to do the experiment. -Teacher discusses the work by having each group to read its answer(s)	teacher. -Students listen attentively. -Students carry out the experiment following the instructions on the worksheet. - Students answer questions on the worksheet -Students discuss their group observations with the teacher.		-What happens to the candle when it is lighted and covered with the beaker? -What is the height of the water in the inverted beaker? -Calculate the percentage of the used air with respect to the length of the smaller beaker.	
Evaluation	Here, ask some key questions from the entire lesson.						5 mins
Conclusion	-The candle burns in air. -Air has an **active part** that supports **combustion** (burning). -This active part is about 20 percent of the air. The part of air that is active is **oxygen**. About 80 percent of air is inactive.						3 mins
Assignment	Read air pollution, its causes and prevention.						2 mins

NB: The teacher is expected to use the above lesson plan format to prepare and teach all successful Chemistry lessons, replacing the experiment with some other activity, as the need arises; thereby making ALL Chemistry lessons to be activity-based and student-centred.

WORKSHEET

Use the materials provided and the procedure below to carry out the experiment, recording your observation in each step. Then answer the questions which follow.

TITLE: Experiment to demonstrate that air is made up of active and inactive parts and to determine the percentage composition of the active part.

REQUIREMENTS:

Candle stuck to a plastic lid, beaker with water, empty smaller beaker, box of matches, ruler, Worksheet.

PROCEDURE

1. Using a burning match stick, melt the base of the 3 cm candle stump and attach it to the plastic lid.
2. Place the candle and plastic lid gently in a beaker containing some water. What do you observe?

_____

3. Using a ruler, measure the height of the second (smaller) beaker in mm (*b* mm). _____
4. Carefully, cover the candle and lid with the second beaker. What do you observe? _____
5. Remove the beaker and light the candle. What do you observe? _____
6. Cover the lighted candle with the same beaker, observe and record your observation. _____
7. Using the ruler, measure the height of the column of water in the inverted beaker in millimetres. _____
8. Compare the height of the column of water in procedure 7(*a* mm) with the height of empty beaker in procedure 3 (*b* mm). _____
9. Did all the air trapped in the beaker in procedure 6 take part in the reaction? _____
10. What fraction of the air in the inverted beaker took part in the burning of the candle? ($\frac{a}{b}$) _____
11. Hence, calculate the percentage composition of the active part of air. ($\frac{a}{b}$ x 100)_____
12. Suggest the name of the part of the trapped air that was used in burning. _____
13. What conclusion can you make from this experiment? _____

_____

NB:

- The two beakers can be improvised by using cut Tangui bottles, but one must be smaller such as to fit into the other.
- The smaller beaker should have a height of about 9 – 15 cm.
- The length/height of the candle stump should be at most one-third of the height of the smaller beaker.
- You do not need a standard laboratory to carry out this experiment. It can be carried out conveniently in the classroom.

SAMPLE PHYSICS LESSON

Name of the teacher:		
School:	Class: FORM 2	Date:
Subject: PHYSICS	Time: 50 minutes	No. of students (B/G) 60
Module III: ENERGETIC	Sub- topic: Current electricity	Teaching Aids: Touch, Calculator, Radio, Batteries, Connecting cables, Bulbs and Switch.
Objective: a observe a battery, read and understand the writings on it. b show that current flows only when there is a power source. c identity components in a circuit. D understand the use of a switch in a circuit.		
Examples of life situation: Energy needs at home during the day and at night.		
Competencies: Exploit the characteristics of a lighted lamp. Be able to replace a damaged bulb. Advise on circuit connections.		
Previous knowledge. a) Things that use electricity at home and why? b) List of things you do using electricity.		

Stages	**Content**	**Objective**	**Teacher activity**	**Student activity**	**Material**	**Evaluation**	**Time/ mins**
Introduction	Review of relevant previous content:	To know the level of my students with respect to electrical matters.	Name four things in your home that use electricity. Why do they need current electricity? Make a list of five things that you have done using current electricity.	Expected answers: Phone, touch, blender, heater, radio, DVD player, TV, computer. They need it to function. Phone calls, listening to music, news, computer games, using a touch, cooking, heating the room, lighting the room.	**Chart**	**- Name things that do not use electricity at home.** **- What will you need most going out at night?**	**5**
Presentation Group work	Identifying a power source.	Students should be able to observe, read and understand inscription place on power sources such	- Provide each group with an AAA, medium size and a 9 V battery. - Ask students to observe the battery and pick out essential	- Write down the voltage on the battery. - Write down the security warning on the battery. - Identity the positive and	AAA, medium size and a 9 V battery.	-What is the voltage on each of the battery? -What is the shape of the terminal with a negative sign? – Why should a battery not be	

		as a battery.	information on it.	negative terminals of the battery.		dispose in fire?	15

		Students should be able to know how current flows in a circuit.	- Present to students some devices that function with current electricity such as radio, calculator, touch, phone and DVD player.	-Study the device and list items that are common in all. (e.g. battery, connecting cables, switch.)	Radio, calculator, touch, phone and DVD player.	- What items are common to all the devices provided?	15
			Using a touch show how current flows.	- Put on the touch without the battery. What happen? - Put on the touch with the switch open. What happen? -Put on the touch with the switch closed. What happen?	Touch containing batteries.	- When does the bulb of the touch light?	8
Conclusion	Do connection to light a bulb.	Students should be able to produce light on their own with available materials.	-Provide students with battery, connecting cables, switch and bulb. -Move round to see how students work and guide.	-Connect the battery, connecting cables, switch and bulb to give light. - examine the voltage on the bulb.	Battery, connecting cables, switch and bulb.	Can current flow in a circuit that does not have a power source? Can the voltage of a battery use in a circuit be much greater than that on the bulb?	7

PHYSICS WORKSHEET

We behave in a way that our actions help our community and country.
It's a fact: We decide how we act!
Responsible people feel pride inside.
We ACT RESPONSIBLY WHEN USING PUBLIC SERVICES

You are provided with some materials. Follow the instructions with the help of your teacher to perform the experiment(s) on the worksheet. Record your observations accordingly.

Title: To show the importance / uses of current electricity at home.

REQUIREMENT: Touch, Calculator, Radio, Phone, DVD player, Batteries, Connecting cables, Bulbs and Switch.

Steps to follow:

i. Name four things that use electricity in your home._____
ii. From the materials provided identify the different types of batteries._____
iii. Write down the voltage on each of the battery._____

iv. Draw one of the batteries and identify the positive and negative terminals._____
v. Write down the security warning on the battery._____
vi. Identify the touch. Put it on without the battery. What happen to the bulb?_____
vii. Insert the battery provided into the touch and switch it on. What happen to the bulb?_____
viii. What does a bulb need to function/light?_____
ix. Where does it come from?_____
x. What other name can be given to a battery? _____
xi. You are provided with a 2.5 V bulb, a battery, switch and connecting cables. Connect the materials to light the bulb.

xii. Examine the voltage on the bulb and compare it to that of the battery. What should be the relation between the two?_____
_____

5.3. Assessment

What is assessment in CBA?

Assessment is the process of gathering information and making judgements about learner achievement for a variety of purposes which include amongst others:

- assisting students to learn;
- evaluating and improving teaching and learning processes;
- providing evidence of satisfactory achievement and completion of the syllabus;
- checking the level of skills and attitude attained by the learner;
- it serves as a yard stick to measure the learner's acquired competencies to meet with the outside world.

The use of assessment for learner achievement allows measures and observations to be made at several points and in different ways throughout the course. Hence assessment marks should provide a valid and reliable achievement of the knowledge, understanding, attitude and skills per learner as described in the syllabuses. The level of achievement of the knowledge, skills, attitude and understanding will be base on performance. All these are rooted in the aims, objectives, outcomes and content of the syllabuses.

Assessment marks should at each point provide a summation of each learner's achievement measured throughout a given period. The assessment components, weightings and task requirements to be applied when assessing are identified below. A variety of tasks should be used to allow learners the opportunity to demonstrate outcomes in different ways and to improve on the validity and reliability of the assessment tools.

The procedure for learner assessment should take into consideration the fact that he/she should be provided with:

- sufficient information on the requirements, nature and timing of the assessment tasks in advance;
- meaningful feedback on performance;

The dimensions for teaching, learning and assessing in Science and Technology in the Observation Sub-cycle and their respective weights are as follows:

Table 3: Dimensions of teaching, assessment weighting and tasks

Dimensions of teaching	% weighting	Assessment tasks
Knowledge and Comprehension	20	Assignments Fieldwork Model making Oral reports Hands-on activities Written reports Research/investigations Projects Tests Team work **Note:** Not more than 50% weighting may be allocated to tests.
Application of Knowledge	30	
Experimental/Process skills	30	
Communication skills	20	

Each of the dimensions has been given a percentage weight that should be reflected in teaching, learning and assessing. The weights show the relative emphasis that the teacher should give in the teaching, learning and assessing.

You will notice that "Application of knowledge" and "Practical and Experimental Skills" have equal weight that is higher than the weight for "Knowledge and Comprehension" and "Communication". This means that the application of knowledge and the use of process skills are considered more important and will therefore need more emphasis in the teaching and assessment system.

The explanation and key words in each of the profile dimensions are indicated below.

Knowledge and Understanding (KU)

Knowledge refers to the ability to remember, recall, identify, define, describe, list, name, match, state principles, facts and concepts. Knowledge is simply the ability to remember or recall material already learned and constitutes the lowest level of learning.

Understanding refers to the ability to explain, summarise, translate, rewrite, paraphrase, give examples, generalise, estimate or predict consequences based upon a trend. Understanding is generally the ability to grasp the meaning of some material that may be verbal, pictorial, or symbolic.

Application of Knowledge (AK)

The ability to use knowledge or apply knowledge, as implied in this programme, has a number of learning/behaviour levels. These levels include application, analysis, synthesis, and evaluation. However, in the Observation Sub-cycle, the teacher is expected to limit his/her teaching to application.

Application refers to the ability to use rules, methods, principles, theories, etc. in concrete situations that are new and unfamiliar. It also involves the ability to produce, solve, operate, plan, demonstrate, discover etc.

Teacher's record

The teacher is called upon to keep a meticulous record of the learner's progress which will constitute the basis for promoting learners from one year to another within the Sub-cycle or from one Sub-cycle to another. Such a record will constitute the learner's portfolio or profile.

Table 4: Sample of teacher's record

NAME OF LEARNER	TASKS											
	ASSIGNMENTS	PROJECT		REPPORTING		HANDS-ON ACTIVITIES		RESEARCH/ INVESTIGATIONS	TESTS	TEAM WORK	TOTAL
		Field work	Modelling	Oral	Written	Individual	Group				

6. OUTCOME OR PROFILE AT THE END OF THE FIRST CYCLE FORM ONE AND FORM TWO

It is expected that at the end of the First cycle Form One and Form Two, the learner would have acquired competencies that will enable him/her to be capable of:

- pursuing further studies;
- working effectively with others as members of a team, group, organisation and community through the sharing of ideas, respect for the opinions of others and learning from one another;
- communicating ideas concisely, clearly and precisely using appropriate symbols, signs and body language;
- identifying and solving real life problems (such as poverty, basic social, health, cultural, political and technological needs, commerce, agriculture, etc.), using critical, inferential and creative thinking skills;
- organising and managing themselves, activities and resources responsibly;
- cultivating the love for effort, hard work, perseverance, the quest for excellence and team spirit;
- respecting the universal ethical values of dignity, honour, honesty and integrity as well as being disciplined in their activities and interaction with others.

7. GLOSSARY OF TERMINOLOGIES USED IN THE SYLLABUSES

Action competence: taking a decision to bring about change independently without doing so as an instruction academic exercise.

Action: This is the activity carried out by an individual to solve a problem or improve a problem situation

Activity: Something done to achieve an objective.

Aptitude: An ability or skill

Assessment: Judgement or decision of the amount, value, quality or importance of something.

Attitude: A feeling or opinion about something or someone; a behaviour that is caused by these.

Category of action: A set of actions sharing a common characteristic. Categories of actions characterise competent actions within a given family of situations

Competence: It is the ability to act in specific situations by making use of a set of integrated resources (knowledge, know-how/aptitude and life skills/practices) acquired in school or from one's surrounding in order to seek solutions to problem situations.

Context: The situation within which something exists or happens and which helps to explain it.

Contextual framework: Related to the context of something

Contextualise: to consider something in its context.

Curriculum: A comprehensive programme of study including all the domains of study and the group of subjects studied in a school.

Curriculum aim: Stated principles that orient a curriculum.

Curriculum goal: The general objective of the curriculum.

Domain of learning: A component of the curriculum that regroups a number of subjects which share some characteristics in common. It is also called area of study or learning.

Essential knowledge: Basic information about a subject which a person gets by experience or study and which is either stored in the person's mind or is known by other people. It constitutes one of the internal resources needed for the development of competence.

Evaluation: To judge or calculate the quality, importance, amount or value of something. In this guide this word is used interchangeably with assessment.
Family of situation: A set of life situations that share a common or some common characteristics. Example: the provision of mankind's consumable needs
Integration activity: Something that is done by mobilising and using internal and external resources with the objective of solving or improving or transforming a problem situation.
Learning: To get knowledge or skill in a subject. Effective learning only occurs when learner's preconceived ideas are replaced by organised knowledge
Legal /policy framework: A system of rules, ideas or beliefs that is used to plan or decide something
Lesson: Knowledge or skill taught to a learner in a subject or domain of study over a given period of time. In the Observation Sub-cycle, a lesson lasts for 50 minutes.
Lesson plan: A step-by-step guideline pedagogic on how to teach a lesson.
Life situation: a set of issues confronting a person or persons in a community and within a particular context.
Module: A unit of instruction within which q number of related topics are studied or taught with the general goal of developing a competence(s).
Notion/concept: The underlying idea in a lesson or a major aspect of the lesson.
Observation Sub-cycle: This is a classification level in the Cameroon secondary education system. It covers the first two years of secondary education also referred to as the junior secondary.
Paradigm shift: A change in the usual and accepted way of thinking or doing things.
Practical work: Ability to provide effective solutions to problems, through the mobilisation of theoretical knowledge, skills and procedures. Practical work always leads to the acquisition of procedural skills.
Programme matrix: A framework within which the teaching programme is organised. In the new teaching syllabuses of the Observation Sub-cycle, the programme matrix consists of the contextual framework, competencies and resources.
Programme of study: See domain of learning
Resources: Tools or means for improving problem situations. Something can only be considered a resource if and only if: the learner can have access to it; make use of it; and if it constitutes an effective means of improving the situation or solving the problem. There are two types of resources, namely: internal or cognitive resources (knowledge, aptitude and life skills/practice) and external resources (material and/or human).

Skills: The ability to do an activity or a job well, especially because of practice.
Stakeholder: A person, citizen or group of people involved with an organisation, institution or society and therefore have responsibility towards it and therefore an interest in its success.
Syllabus: A plan showing the objectives and content to be studied within a subject, a particular course or domain of learning over a specified time and especially one that leads to an examination.
Teaching: A set of pedagogic actions that results in imparting knowledge and skills to someone. Modern teaching prescribes facilitation the construction of knowledge and skills rather than giving ready-made knowledge and skills to learners.

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