



REPUBLIC OF TRINIDAD AND TOBAGO

MINISTRY OF EDUCATION

Secondary School Curriculum

Technology Education

Curriculum Development Division

DRAFT

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Contents

A Message from the Director	v
Acknowledgments	vi
Part 1 The National Curriculum for Forms 1 - 3.....	viii
National Curriculum Framework	1
Foundation of the National Curriculum	3
Value Outcomes	4
Education Policies That Impact on the Curriculum	7
The Curriculum Development Process	11
The Core Curriculum Subjects	17
Information and Communication Technology (ICT) Infusion into the Curriculum	19
Literacy across the Curriculum	21
PART 2 Technology Education Curriculum.....	25
Introduction	26
Rationale for the Teaching of Tech Ed	27
Evolution of Technology Education's Subject.....	28
Philosophical Statement Underpinning the Teaching of Technology Education	30
Vision for Technology Education Implementation	30
Key Definitions in Technology Education.....	31
Expected General Learning Outcomes.....	32
Outline of Curriculum Content	33
PART 3 Curriculum Content	34
Biological Technologies.....	35
Sub-component: Agricultural Technology	38
Sub-component: Environmental Management Technology	41
Sub-component: Health and Wellness Technology	44
Engineering Technologies.....	47
Sub-component: Automation Technology	51

Sub-component: Automation Technology	53
Sub-component: Building Technology	56
Sub-component: Design Technology	59
Sub-component: Electrical and Electronic Technology	62
Sub-component: Mechanical Technology	66
Entrepreneurship	71
Sub-component: Business Planning	74
Sub-component: Document Preparation	79
Sub-component: Record-keeping	83
Human Ecology	86
Sub-component: Clothing and Textiles Technology	89
Sub-component: Consumer Technology	92
Sub-component: Food Technology	95
Conclusion	98
Bibliography	99
References	100
Appendix 1	103
EXAMPLE OF INSTRUMENT FOR	103
PERSONAL SWOT ANALYSIS	103

A Message from the Director

The Curriculum Guides and Teachers Guides have been developed by educators and teachers. They are intended to facilitate the preparation of students to meet the rapidly changing demands of life in the 21st century, while ensuring that they acquire the core of general knowledge and experience essential for higher education. The revised curriculum represented is designed to guide the adoption of a more student-centred approach to instruction, and the provision of learning opportunities that are relevant and inclusive of varied learning needs and interests.

We have seen profound changes in the use of technology in education, the need for a greater focus on morals and values education and increased acquisition of life skills. There is no doubt that further shifts will take place in the coming years. The challenge for us as educators is to find ways to make our approach to teaching flexible, progressive, and responsive, so that we embrace change where it benefits learners. This entails becoming lifelong learners ourselves and creating environments that provide necessary community and stakeholder support and foster professional development.

The design of the revised curriculum documents was based on sound, contemporary educational theory, best practice, and system data. These documents will serve as foundational guides for the development of instructional programmes to be implemented at the Forms 1-3 levels.

The Curriculum Development Division is confident that the revised National Curriculum Guides and the Teachers Guides for Forms 1–3 will contribute significantly to enhanced teaching and learning experiences in our secondary schools. Accordingly, the curriculum is the main channel to educate and develop children towards being academically balanced, healthy and growing normally, well-adjusted socially and culturally, emotionally mature and happy and enabling them to achieve their full potential

John Roopchan

Director of Curriculum Development

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Part 1
The National Curriculum for
Forms 1 - 3

National Curriculum Framework

Introduction

This curriculum framework is intended to outline the nature and purpose of the curriculum as well as the parameters for consistent curriculum implementation throughout secondary education in Trinidad and Tobago. The document sets out the principles that govern and guide teaching and learning. The term ‘curriculum’ is used in this document to describe the sum total of the planned experiences which occur within that environment and was designed to foster children's learning and development. These include activities and events, with either direct or indirect impact upon the child.

A clear understanding of the nature, role and function of the national curriculum for Trinidad and Tobago is a critical part of the whole positive transformation of education to provide a seamless pathway for all students through the system of teaching and learning. For Trinidad and Tobago, the National Curriculum Framework becomes the basis for all education and curriculum decision-making, including the design, development and implementation strategies for a new system of teaching and learning covering those foundation years of education. The statement of outcomes for students are a key part of this education framework and forms the basis for all subsequent decisions about teaching and learning, content, pedagogy and assessment. These must work towards fulfilling the vision for successful students and future citizens of our nation.

In order to establish common ground and ensure that the curriculum can be implemented as designed, a set of foundational principles needs to be established. This National Curriculum Framework establishes a consistent foundation for learning that is undergirded by the Ministry of Education vision, mission and the five value outcomes for all children.

The National Curriculum must ensure that all curriculum activity, including implementation at the classroom level, functions within the guiding principles of education established by the Ministry of Education. The guiding principles of the Ministry of Education (*Education Sector*

Strategic Plan 2011-2015 p.g. XI) were developed after extensive stakeholder dialogue and sound analysis of the current societal and national requirements.

For an effective and relevant twenty-first century process of teaching and learning, these guiding principles are an indicator that the Ministry of Education seeks to place education in Trinidad and Tobago alongside, if not ahead of international best practices. The Ministry of Education has established an *Education Sector Strategic Plan 2011-2015* to achieve the goals of quality, innovative, challenging, flexible education for all, and has begun an investment in human and material resources to achieve this outcome in a purposeful and timely fashion.

Foundation of the National Curriculum

Curriculum development is informed by the vision and mission of the Ministry of Education. The design of revised curriculum documents for implementation at the classroom level is therefore guided by the principles and policies of the Ministry of Education.

A forward-looking perspective on what all schools should be facilitating in terms of student achievement is guided by the national curriculum. There is equal clarity regarding a twenty-first century education system functioning to provide the highest standard of education. The regulatory and guiding principles for education provide the overarching national framework for education.

The Ministry of Education, *Education Sector Strategic Plan: 2011-2015*, and other policy documents, establish the design framework for all components of the new curriculum. Principal among these are the vision, mission and the five (5) value outcomes established at the national level for all students, which further guides the formulation of the desired and intended learning experiences for the classroom in the curriculum guide.

Vision of Ministry Of Education

The Ministry is leading a quality education system that responds to the diverse needs and requirements of 21st century learners, promotes inclusivity, seamlessness, equity and equality and contributes to human capital and sustainable development.

GORTT, Ministry of Education, Education Sector Strategic Plan: 2011-2015

The Mission statement is derived from the Vision of the Ministry Of Education. The Mission statement will guide the revision of the curriculum to meet the needs of the learners.

Mission of Ministry Of Education

To educate and develop children who are able to fulfil their full potential; healthy and growing normally; academically balanced; well-adjusted socially and culturally; and emotionally mature and happy.

GORTT, Ministry of Education, Education Sector Strategic Plan: 2011-2015

Value Outcomes

An internal analysis of the education system, together with research conducted in international forums, has shown that the curriculum is core to the development of innovative people. This curriculum is aimed at attaining the five value outcomes of the Ministry of Education that help to define standards of attainment for all secondary school students.

The Ministry of Education's overarching goal is to educate and develop children who are:

- Able to fulfil their full potential
- Academically balanced
- Healthy and growing normally
- Well-adjusted socially and culturally
- Emotionally mature and happy

Every core curriculum subject must facilitate the achievement of these value outcomes by all students. The core curriculum subjects, their content and the suggested teaching, learning, and assessment strategies are the means to fulfil the holistic development of the student.

It is expected that by the end of secondary school education, students will achieve all five value outcomes in order to make informed choices and contribute to the needs of society.

The five value outcomes are described more fully below.

A. Children who will achieve their full potential.

1. Function with a purpose based on love, value, family life, service and aesthetic expression.
2. Understand and participate constructively in their career and vocational pathway.
3. Able to cope with daily challenges, set healthy boundaries and make wise social choices.
4. Productive achievers, role models with good work ethics.
5. Will function at their best with a strong sense of commitment to their interests and activities.
6. Optimize their God-given talents to advantage.
7. Enterprising and responsible in risk taking.
8. Recover quickly from setbacks and disappointments.
9. Achieve economic well-being and make a positive contribution to society.

B. Children who are adequately prepared educationally to fulfill their potential.

1. Prepared to participate in society as appropriate to their age.
2. Academically balanced to be productive (combination of appropriate skills and competencies).
3. Skilled in critical and creative thinking, problem-solving, visioning, thinking outside the box and receptive to new ideas.
4. Skilled in the use of current technology and the Internet (cyber wellness).
5. Proficient in a second language.

C. Children who are adequately developed socially and culturally.

1. Productive and have good self-image.
2. Enquiring, confident and strong among their peers, and emotionally secure, open, honest and emphatic in relationships.
3. Competent to interact and communicate with others, within different social settings and environments.
4. Patriotic and courageous in civic affairs and proud to be identified as members of the national and Caribbean Community.
5. Historically aware, including knowledge of our people.
6. Capable of informed participation in the democratic and political process.
7. Capable of functioning with good character and values in their culture.
8. Respectful of the law, authority, the rights of others, creative imagination in its different forms and of the right to divergent views.
9. Developed with interpersonal and language skills.
10. Environmentally aware, protective of the physical environment and demonstrates an understanding of sustainable development.
11. Able to lead, have good governance skills, are competent to respond to the challenges of new roles in multiple contexts and are able to manage conflict.
12. Humanely aware of the less fortunate and the disadvantaged and committed to contributing to the welfare of our community and country.
13. Functioning with an honest sense of family and community.
14. Proficient in dealing with daily conditions.
15. Skilled in finding a safe place to think and grow.
16. Confident in themselves, self-motivated, enterprising and pursue self-education and lifelong self-development and able to work independently and with others.

17. Capable of finding assistance if they are abused or neglected.
18. Spiritually aware with the emotional and intellectual resources to pursue their spiritual growth.
19. Appreciative of the contribution of the arts to daily life, cultural identity and diversity, locally, regionally and internationally.
20. Able to express themselves through the arts.

D. Children who are healthy and growing normally.

1. Secure and safe in their home, school, and community.
2. Physically fit, mentally alert, well nourished, and psychologically sound.
3. Active in exercise, sports, games and recreation.
4. Capable of wholesome interaction with peers.
5. Morally prepared for a productive life.
6. Adequately developed neurologically to overcome learning, speaking, hearing, focusing, and memory or mobility challenges.

E. Children who are emotionally developed, mature and happy.

1. Able to enjoy daily life, have fun and express happiness and positive emotions.
2. Participants in entertainment and celebration.
3. Established in their peer group, satisfied with their life and able to achieve meaning in their lives.
4. Mature and able to become full-fledged, productive and enterprising citizens.

Further readings -GORTT, Ministry of Education, Education Sector Strategic Plan: 2011-2015

Education Policies That Impact on the Curriculum

Several policies from the Ministry of Education were taken into account for the revision of the Lower Secondary School Curriculum. These include the Education Sector Strategic Plan 2011-2015, the ICT policy and National Schools Code of Conduct. Three policies that have direct impact on the development and implementation of the curriculum are discussed.

Education Sector Strategic Plan 2011-2015

The Education Sector Strategic Plan purports a vision for education premised on guiding principles which informed the curriculum design and development process. They will provide reference points to ensure that the desired attributes of education are achieved. The guiding principles, listed below, are important components in the revised curriculum.

<i>Principle</i>	<i>Elaboration</i>
Student Centered	The student is at the centre of everything we do.
Engaged Communities	We engage parents and families as the heart of students' lives and we support and acknowledge them as the primary guides and decision-makers for students. We engage members of local, regional and global communities as active contributors to student learning
Inclusive	We expect all students will learn in a welcoming environment regardless of place, culture, or learning needs.
Proactive	We plan for a desired future, preventing problems instead of reacting to them.
Shared Responsibility	We acknowledge that education is everybody's business and therefore expect teachers, the school and education leaders to collaborate with other government and community organizations to foster student learning
Innovative	We explore new learning opportunities through research, innovation and professional development to ensure continuous improvement of student

	learning.
Flexible	We enable meaningful and relevant learning through a range of opportunities appropriate to each student's development stage.
Equitable	We ensure that every student will have the benefit of high-quality learning opportunities.
Accountable	We explain to the citizens of Trinidad and Tobago the outcomes of our students and our use of funding.
Transformative Leadership	We believe that people with vision and passion can achieve great things. We therefore empower and inspire our staff and stakeholders to create positive and lasting changes in the education system.
Quality	We are committed to meeting our won quality standards that are driven by the requirements of our customers. Each of us takes charge to ensure that these standards are implemented in our individual areas of authority.
Teacher Empowerment	We create the environment for excellence in teaching practice that improves the learning of all students, deepens educators content knowledge, provides them with research-based instructional strategies to assist students in meeting rigorous academic standards, and prepares them to use various types of classroom assessments appropriately.

ICT in the Curriculum

The ICT Policy goals and objectives of the Ministry of Education are to:

- i. Ensure all stakeholders possess the critical requisite skills and competencies to use ICT in the education system as a tool to enhance learning and teaching, communication and research, and to generate innovative processes;
- ii. Encourage innovative models of ICT use such as:
 - teacher education;
 - teaching;
 - learning; and
 - curriculum materials development
- iii. Harmonize activities, approaches and standards in the use of ICT within the

Education System

- iv. Encourage critical and creative thinking, lifelong learning and social responsibility;

ICT in education in Trinidad and Tobago would create an educational system in which students leave schools as confident, creative and productive users of new technologies, including information and communication technologies, and understand the impact of those technologies on society.

The Ministry of Education's ICT in Education Policy (pp. 28–29) refers to Curriculum Content and Learning Resources as;

- Curriculum and content must increasingly maximize the use of ICT.
- ICT must be integrated into the development and delivery of the curriculum.
- The ICT curriculum needs to be reviewed frequently in order to maintain its relevance.
- ICT integration and ICT competency measures across the curriculum shall be driven through the development and delivery of an ICT-infused curriculum.

ICT in education would create an environment that encourages creativity, innovation, critical thinking and decision making.

Inclusive Education Policy

The Ministry of Education is committed to “support the delivery of inclusive education in all schools by providing support and services to all learners, and by taking appropriate steps to make education available, accessible, acceptable and adaptable to all learners.” An inclusive curriculum is acknowledged to be the most important factor in achieving inclusive education. In planning and teaching the school curriculum, teachers are therefore required to give due regard to the following principles:

- i. The National Curriculum Guides set out what most students should be taught at lower secondary school but teachers should teach the required knowledge and skills in ways that suit students' interests and abilities. This means exercising flexibility and

drawing from curricula for earlier or later class levels to provide learning opportunities that allow students to make progress and experience success. The degrees of differentiation exercised will depend on the levels of student attainment.

- ii. Varied approaches to teaching, learning, and assessment should be planned to allow all students to participate fully and effectively. Account should be taken of diverse cultures, beliefs, strengths, and interests that exist in any classroom and that influence the way students learn.

Copies of these documents may be obtained from the Ministry offices or the website at <http://moe.edu.tt/>.

The Curriculum Development Process

The term 'curriculum' has several meanings, depending on the context and the perspective of curriculum theory that is applied to the definition. Most theories concur that there are four fundamental components within definitions of curriculum:

- Curriculum as the transmission of a body of knowledge.
- Curriculum as product - defined by the ends or achievements expected.
- Curriculum as process.
- Curriculum as praxis

This revised curriculum subscribes to an eclectic approach which is an amalgamation of the above definitions.

The foundation of the National Curriculum is also informed by a wealth of available curriculum theories and processes. The major forces that influence and shape the organization and content of the curriculum include:

1. Educational philosophy and understandings about the nature of knowledge
2. Society and culture
3. The learner and learning process
4. Learning theories
5. The nature and structure of subject matter to be learned

Thus, these areas represent the foundation on which the national curriculum is revised. These areas will inform educational goals with the aim of developing a coherent, culturally focused, and dynamically evolving curriculum.

This revised curriculum displays a learner-centred design with philosophical assumptions that are mainly constructivist. It seeks to educate and develop children who are able to fulfil their full potential; healthy and growing normally; academically balanced; well-adjusted socially and culturally; and emotionally mature and happy.

The curriculum process was developed through four stages:

Stage 1 of the curriculum development process consisted of consultations with stakeholders from a cross-section of the national community.

The Ministry of Education conducted one national consultation on the secondary education curriculum, along with 3 joint-district consultations and one in Tobago. Consultations were held with representatives from the various divisions of the Ministry of Education, Students, denominational and local school boards; members from the primary and secondary principals association, members of the business community, Unions, representatives from tertiary institutions, representatives from Non-Governmental Organizations (NGOs), parents, and special interest groups. These key stakeholders provided valuable information which helped to inform curriculum change to better prepare students to meet the needs of society.

Stage 2 of the process involved the analysis of findings from opinions, experts, relevant documents and best practices which informed the design of the revised curriculum to enable a set of desirable outcomes and essential competencies to be possessed by all students.

Data from different sources together with other policy documents were examined and a unanimous decision was taken for the following to be core:

English Language Arts, Mathematics, Science, Visual and Performing Arts (VAPA), Physical Education, Spanish and Health and Family Life Education (HFLE), Technology Education, Information and Communication Technology (ICT) and Social Sciences which comprise History, Geography, Social Studies, Religious Education.

In order to develop the student holistically, emphasis was also placed on ICT integration, Sexuality and Sexual Health Education, Health and Wellness, Literacy and Numeracy.

At **Stage 3**, subject experts produced the revised curriculum documents. For each subject, a Curriculum Guide and Teachers' Guide was developed. Teachers with specific subject or curriculum development skills from schools were also included in the creation of these curriculum documents. The outputs of this phase included learning outcomes specific to each subject that contribute to the fulfilment of the national outcomes; subject content; teaching, learning and assessment strategies to support the outcomes. As part of the development process,

the curriculum was validated by feedback solicited from Universities and other key stakeholders. Continued consultations with key stakeholders will provide feedback to inform curriculum evaluation and further validation.

These curriculum documents will provide learning opportunities, teaching and learning strategies, assessment strategies and instructional plans which will contribute to the full potential of the students.

Stage 4 involved the implementation of the revised curriculum. Implementation of the curriculum is a dynamic process, requiring collaboration of the curriculum coordinators / officers and teachers. In implementing, teachers are expected to use the formal curriculum, as described in the curriculum guides, to plan work and teach in a manner that accomplishes the outcomes described. Teachers are expected to translate those outcomes into units of study, determining the appropriate sequence and time allocation according to the learning needs of their students. Although the curriculum documents provide sample teaching and assessment strategies, it is also the role of the teacher to select and use sound teaching practices, continually assessing student learning and systematically providing feedback to curriculum teams for use in revising and improving the guides.

The revised curriculum documents will be implemented initially for Forms 1 then at the Form 2 level and finally at the Form 3 level. Curriculum officers responsible for specific subject areas will monitor and support teachers in the implementation of this curriculum through school visits.

A curriculum development system provides support for the tasks of curriculum implementation. The system advocated by the Ministry of Education involves stakeholders, specialist curriculum officers, principals, heads of departments, and teachers, each with specific roles and responsibilities. Some of these are outlined in the table below.

System Component	Members	Role
Strategic Executive Team (SET) of the Ministry of Education	Consultants, Advisors	<ul style="list-style-type: none"> • Advise on curriculum policy, goals, and standards.
Curriculum Development Division (Head Office and District-based)	Curriculum officers	<ul style="list-style-type: none"> • Plan and develop curriculum. • Provide leadership in identifying curriculum goals and determining the process for development of curriculum materials. • Lead writing teams (which include teachers). • Monitor implementation. • Provide teacher support. • Facilitate teacher professional development for curriculum implementation. • Advise on processes and materials for effective implementation and student assessment. • Evaluate curriculum.
School Curriculum Management Team	Principal/Vice Principal and Heads of Departments	<ul style="list-style-type: none"> • Make major decisions concerning the school curriculum, such as assigning resources. • Provide guidelines for Instructional Planning Teams.
Instructional Planning Teams/School	Teachers	<ul style="list-style-type: none"> • Cooperate on tasks necessary for effective implementation,

Instructional Committees		such as: yearly work plans, units of study, development of materials to individualize the curriculum, identification and development of learning materials, student assessment and evaluation.
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At the school level, the curriculum refers to all the learning and other experiences that the school plans for its students. It includes the formal or written curriculum, as well as the informal curriculum, which is comprised of other developmental opportunities provided by the school, such as those offered by student clubs, societies and committees, and sporting organizations (e.g. cricket team, debating society, Guides, Cadets).

The School Curriculum Management team develops a School Curriculum that must be in alignment with the National Curriculum. The School Curriculum Management team usually consists of the Principal and/or Vice Principal and Heads of Department. The duties of the School Curriculum Management team include the development of school culture, goals, vision, and curriculum in alignment with the national curriculum and culture. It also provides support for curriculum work and performs evaluation functions.

In providing support for curriculum work, the Management team may, for instance:

- encourage teachers to identify challenges and try new ideas;
- develop timetables to allow for development of curriculum materials, for example, year plans, units, instructional materials;
- ensure availability of learning materials;
- provide instructional leadership;
- ensure that appropriate strategies are formulated to promote student success.

- monitors the curriculum (using, for example, observation, test scores, student books, formal and informal discussions with different stakeholders);
- assesses the hidden curriculum (including discipline policies, fund allocation, physical environment);
- evaluates the school programme of studies.

The roles of instructional teams are described below:

- Develop/Revise/Evaluate work programmes
- Determine resource needs
- Identify/Develop instructional materials
- Conduct classroom action research
- Integrate and align curriculum
- Identify and develop appropriate assessment practices
- Develop reporting instruments and procedures (student and teacher performance)
- Keep records

The roles of teachers are described below:

- Develop/Revise instructional programme
- Individualize curriculum to suit students' needs and interests
- Develop/Evaluate/Revise unit plans
- Develop/Select appropriate learning materials
- Select appropriate teaching strategies to facilitate student success
- Integrate the curriculum as far as possible, and where appropriate
- Select appropriate assessment strategies
- Monitor/Assess student learning and keep records
- Evaluate student performance
- Evaluate classroom programmes
- Conduct action research
- Collaborate with colleagues

The revised lower secondary curriculum for Trinidad and Tobago provides every opportunity for the child to learn, master new important skills and develop attributes and values that are critical to their role as emerging productive, caring and responsible citizens.

The Core Curriculum Subjects

The core curriculum subjects are those for which every student is required to demonstrate achievement of the stated outcomes in Forms 1–3.

A minimum time allocation is recommended for each core subject. The principal, as instructional leader of the school, will make the final decision as to time allocation, according to the needs of the students and the resources available at any given time.

The subjects and the recommended time allocations are as follows:

The number of periods per subject is based on:

- A 5 day cycle
- 7 periods per day
- Approximately 40 minutes per period

SUBJECT	NUMBER OF PERIODS PER WEEK
English Language Arts (ELA)	6
Mathematics	5
Spanish	3
Science	4
Physical Education	3
Technology Education	3
Visual and Performing Arts (VAPA)	4
Information and Communication Technology (ICT)	1
Health and Family Life Education (HFLE)	2
Social Sciences (History, Geography, Religious Education, Social Studies)	4

FRAMEWORK FOR AREAS OF STUDY IN SOCIAL SCIENCES

- Social Sciences comprise of the following subjects: Social Studies, History, Geography and Religious Education.
- Four periods are dedicated to Social Sciences.
- Two periods will be dedicated for Social Studies from Forms 1-3 all terms.
- Two periods each will be dedicated to History, Geography and Religious Education according the table below.

	TERM 1	TERM 2	TERM 3
FORM 1	<ul style="list-style-type: none">• SOCIAL STUDIES• HISTORY	<ul style="list-style-type: none">• SOCIAL STUDIES• RELIGIOUS EDUCATION	<ul style="list-style-type: none">• SOCIAL STUDIES• GEOGRAPHY
FORM 2	<ul style="list-style-type: none">• SOCIAL STUDIES• GEOGRAPHY	<ul style="list-style-type: none">• SOCIAL STUDIES• HISTORY	<ul style="list-style-type: none">• SOCIAL STUDIES• RELIGIOUS EDUCATION
FORM 3	<ul style="list-style-type: none">• SOCIAL STUDIES• RELIGIOUS EDUCATION	<ul style="list-style-type: none">• SOCIAL STUDIES• GEOGRAPHY	<ul style="list-style-type: none">• SOCIAL STUDIES• HISTORY

At the end of Form 3, students will be assessed for the National Certificate of Secondary Education (NCSE), Level I.

Information and Communication Technology (ICT) Infusion into the Curriculum

Information and Communication Technology (ICT) infused in the curriculum is intended to ultimately transform teaching and learning to meet the needs of twenty-first century learners and better prepare them to be global citizens. The use of ICT integration initiatives should support the development of critical skills such as knowledge construction, problem-solving, critical thinking, collaboration, communication, innovation, inquiry, digital literacy and entrepreneurship.

ICT covers all the technologies used for the handling and communication of information. These technologies include:

- Computers/laptops
- Storage devices (e.g. flash drives, CDs)
- Mobile devices/handheld devices
- Satellite communication
- Audio & Audio visual systems
- Cloud computing
- Email/messaging

In addition to the above named technologies, there is a generation of Web 2.0 tools that facilitate a more engaging and interactive learning experience in the classroom. The following is a small sample that may be useful to teachers and students:

- Social networking sites (including educational social networking platforms like Edmodo)
- Blogs, wikis, forums
- Photo and Video sharing tools (e.g. Flickr, Instagram, Youtube)
- Cloud storage (e.g. Skydrive, Dropbox, Deego)
- Digital Story telling tools (e.g. Story Maker)
- Social bookmarking and annotation tools (e.g. Diigo)
- Inspirational tools and lessons (e.g. TED Talks/Ed)
- Screen casting/screen capture tools (e.g. Jing)

- Word cloud generators (e.g. Wordle)

The process of integrating ICT into the curriculum requires that administrators and teachers find ways to incorporate ICTs into teaching and learning to maximize educational outcomes, making learning relevant and meaningful. This integration can only be successful if it is carefully planned, managed, monitored, evaluated. Additionally, appropriate measures should be devised to provide support wherever needed according to the context of the school environment.

It is hoped that educators continue to be creative and resourceful, making full use of the resources that are available to them as they plan instruction.

Literacy across the Curriculum

Literacy is about more than reading and writing – it is about how we communicate in society. It is about social practices and relationships, about knowledge, language and culture. Literacy ... finds its place in our lives alongside other ways of communicating. Indeed, literacy itself takes many forms: on paper, on the computer screen, on TV, on posters and signs. Those who use literacy take it for granted – but those who cannot use it are excluded from much communication in today's world. Indeed, it is the excluded who can best appreciate the notion of "literacy as freedom". (UNESCO, Statement for the United Nations Literacy Decade, 2003–2012)

The revised lower secondary curriculum addresses the literacy needs of all learners as they interact with a variety of texts across the different subject disciplines. Research indicates that students who struggle have significant difficulty navigating mathematics, science and social sciences texts in which the language is expository, dense and full of difficult vocabulary (Allen 2000). This underscores the need for all teachers to support students' literacy development since literacy skills are needed if students are to access the entire curriculum.

Teachers of English address students' literacy by teaching the skills of listening, speaking, reading and writing in an explicit and systematic manner. The goal of literacy instruction is to improve learning by building students' comprehension and communication skills. **Teachers of other content areas** have the responsibility of extending students' literacy instruction by teaching the subject-specific literacy of their respective subject areas. Literacy is embedded in every subject so teachers must create literacy-rich activities for students that will strengthen and support subject-specific learning.

The table below illustrates generic literacy activities that content area teachers and students can engage in to build the core skills of listening, speaking, reading, writing and representing as the curriculum is enacted in all subjects.

Table 1: BUILDING LITERACY SKILLS ACROSS ALL SUBJECT AREAS

LITERACY SKILLS	STUDENT ACTIVITY IN ALL SUBJECTS	TEACHER SUPPORT
Listening and Speaking	Engage in collaborative discussions	Set ground rules for discussions
<ul style="list-style-type: none">Aesthetic Listening	Make oral presentations that include use of ICTs	Listen attentively
<ul style="list-style-type: none">Efferent Listening	Express ideas, perceptions and feelings about what is being learnt	Facilitate discussions and explanations

<ul style="list-style-type: none"> • Critical Listening 	<p>Listen to videos, film clips, audio tapes, DVDs, CDs</p> <p>Engage in discussions related to their learning and to their multicultural environment</p> <p>Engage in critical listening to process information and solve problems</p> <p>Engage in critical reflection on ethical issues related to subject</p>	<p>Source audio texts of related content for discussion</p> <p>Help students interpret and analyse what they listen to</p> <p>Develop students' presentation skills</p>
<p>Reading</p> <p>Textbooks E-books Reports Interviews Surveys Newspapers Magazines Multi-media texts</p>	<p>Engage in individual, peer and group reading</p> <p>Extract details relevant to learning</p> <p>Make inter-textual references</p> <p>Access and read e-books and online information</p> <p>Critically reflect on and interpret ideas presented in multi-media texts</p> <p>Identify problems and discuss solutions</p> <p>Read for information and enjoyment</p>	<p>Model reading of subject content to students</p> <p>Model the Think Aloud strategy</p> <p>Engage students in reading as a process</p> <p>Explain technical terminology and subject-specific vocabulary</p> <p>Indicate features of text and internal organization in subject-specific materials</p> <p>Provide graphic organisers/ concept map templates for student use</p> <p>Help students interpret, analyse and evaluate subject-specific content</p> <p>Help students connect subject content to the world beyond the classroom</p>
<p>Writing</p> <p>Expository Persuasive Technical</p>	<p>Use graphic organisers to plan and record ideas</p> <p>Engage in individual and shared writing</p>	<p>Infuse technology when modelling writing of subject content</p> <p>Explore subject-specific</p>

Reflective	<p>Create descriptions, songs, raps, narrations, explanations</p> <p>Create comics and story boards</p> <p>Engage in reflective thinking when writing</p> <p>Use ICTs to produce and publish pieces</p>	<p>vocabulary and language use</p> <p>Explain internal organization of subject-specific texts</p> <p>Provide graphic organizers/ concept map templates</p> <p>Create blogs for collaboration</p> <p>Encourage emailing of student responses</p> <p>Help students interpret, analyse and evaluate what they write</p>
Representing	<p>Present work learnt through role play, movement, monologues, tables, graphs, maps, songs, posters, diagrams, letters, brochures, written paragraphs, essays, reports, cartoons, comics, models, digital presentations</p>	<p>Encourage a range of presentation types/modes</p> <p>Infuse ICTs when teaching subject content</p> <p>Encourage use of ICTs in students' presentations</p>

Failure to acquire literacy skills for learning across subject disciplines is a major risk which the revised curriculum seeks to address. Literacy lies at the heart of student understanding and achievement. For the curriculum to be enacted in a meaningful manner that benefits all students, effective subject-specific literacy teaching is critical. Each content area requires skills for effective reading and studying of text materials. To support literacy development, content area teachers must know how to teach the skills so that students can bridge existing gaps. Literacy skills are essential for good communication, critical thinking and problem-solving at school and for success in life beyond school.

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PART 2

Technology Education Curriculum

DRAFT

Introduction

The Technology Education (Tech Ed) curriculum for Forms 1-3 of our secondary schools was first introduced to the national educational community in 2001 to replace three separate subject areas, Industrial Arts, Home Economics, and Agricultural Science. These subject areas had been implemented mainly in the Junior Secondary schools which were built in the 1970s and were looked upon as prevocational curricula. In the early 1990s, there were calls for improvements in quality, relevance, representation of technological changes, and the use of different methodologies for instruction and assessment in technical-vocational (tech-voc) education. By 2003, curriculum guidelines had been developed for Forms 1-3 by teams of tech-voc teachers and their curriculum supervisors, in all the major tech-voc fields of study, but to varying degrees. For example, there was a dearth of learning experiences in some of the Industrial Arts skill areas. In 2008, a revised Tech Ed curriculum was produced which took into consideration the comments and suggestions of stakeholder groups. In particular, components and sub-components were rethought, new challenges were created, and a more flexible framework for implementation was offered.

From the beginning of the implementation period, there was a great deal of resistance to the replacement of the prevocational curricula. Many persons claimed that Tech Ed would remove the educational system's attempt to introduce tech-voc learning opportunities to young persons and thereby reduce their capacity to contribute to the country's social and economic development. Few persons were aware and welcoming of the different and enriched curriculum opportunities offered by the Tech Ed curriculum. The initial substantial requirements for human and physical resources, e.g. teachers with tech-voc skills and dedicated laboratories, were also seen as a hindrance to universal implementation. However, in the ensuing years, as its benefits were recognised, more and more schools have taken up the challenge of implementing Tech Ed. Over the last eight years of the NCSE Examinations, Tech Ed has experienced an average pass rate of above 50%, however, the qualitative results of its implementation since the 2003 curriculum are even more impressive.

During the national consultations which preceded the current revision exercise, all stakeholders expressed complimentary views on the benefits of Tech Ed. They agreed that students were benefitting from its attempts to promote creativity, innovation, problem solving skills, critical thinking skills, teamwork skills, and research skills, in a hands-on challenging environment. Students were enthusiastic and highly motivated when engaged in the construction of models, prototypes, events and products using a variety of tools and materials. Furthermore, when teachers understood and applied the aims and principles behind the Tech Ed instructional and assessment methodologies, they felt a similar excitement and passion as the designers and developers of the subject. This understanding was engendered as over five hundred (500) teachers have engaged in training in Tech Ed implementation which occurs twice-a-year, over a two-week period, during the school holidays. The training is organized and conducted by the Technical and Vocational Education and Training Unit (TVETU). Teachers are also involved in on-site, one-day workshops, where TVETU personnel provide training in specific skill areas in support of implementation efforts. The designers and developers of Tech Ed hope to engender even more excitement as we add more content and different content in the 2014 version of the Tech Ed curriculum while urging teachers to continue to make use of the valuable material available in the 2003 and 2008 versions.

Rationale for the Teaching of Tech Ed

Whereas the first two versions of the Tech Ed curriculum were responses to learning outcomes seen as essential for graduates of our secondary schools, the 2014 version is underpinned by the detailed and significant Value Outcomes set out in the Strategic Plan 2011-2015 of the Ministry of Education of Trinidad and Tobago. In particular, the interdisciplinary nature of the 2014 Tech Ed Curriculum Guide aims to support children in achieving their full potential by providing opportunities that are a mix of academic principles and tech-voc skills, embedded in challenging activities that are economically, socially and culturally oriented. Tech Ed emphasizes access and use of technology in research and in the production of prototypes, products and service events as solutions to authentic, real world problems. The Guide's content relates to contemporary problems and issues in society such as urban living, environmental concerns, health and wellness. Other challenges focus on personal development needs such as construction skills,

entrepreneurial knowledge, and safety principles. Tech Ed's instructional and assessment approaches continue to facilitate the student's acquisition of 21st century skills as it requires that students collaborate, cooperate, and operate with high levels of interpersonal skills, as well as the capacity to act in ethically and morally responsible ways. Finally, Tech Ed is inclusive of students with varying abilities, aptitudes, and interests, by providing avenues for all students to learn by making decisions in safe environments that promote and encourage creative risk-taking.

Evolution of Technology Education's Subject

Tech Ed continues to be an activity-based, student-centred curriculum. In its current form, Tech Ed challenges are drawn from both familiar and new contexts as the country and its population, cope with rapid and unpredictable economic, social and cultural changes. **Table 1** provides a synopsis of the changes made over the three (3) iterations of Tech Ed as a new subject in the curriculum of the lower secondary classes of the education system of Trinidad and Tobago.

Table 1
Changes in components over the period 2003-2014

2003	2008	2014
Biotechnology and Related Technologies	Biological Technologies	Biological Technologies
Energy, Power and Transportation	Energy and the Built Environment	Engineering Technologies
Communication	Information and Communication Technologies	Entrepreneurship
Production	Materials Technologies	Human Ecology

The major changes in the 2014 version of Tech Ed recognise the importance of deepening the Tech Ed student's grasp of design and sketching skills, increasing students' awareness and knowledge of the art and science involved in new technical areas in automation as well as increasing and nurturing the spirit and skills of entrepreneurship. These changes add value to Tech Ed's traditional base in the tech-voc areas of Industrial Arts, Home Economics and

Agricultural Science. The components and sub-components of the 2014 Tech Ed curriculum are set out briefly below in **Table 2**. The labels are explained in greater detail at the beginning of the section where the Challenges to students are presented.

Table 2
Components and sub-components of the 2014 Tech Ed Curriculum Guide

REVISED COMPONENTS AND SUB-COMPONENTS			
Biological Technologies	Engineering Technologies	Entrepreneurship	Human Ecology
Agricultural Technology	Automation Technology	Business planning	Clothing and Textile Technology
Environmental Management Technology	Building Technology	Document Preparation	Consumer Technology
Health and Wellness Technology	Design Technology	Record-keeping	Food Technology
	Electrical and Electronic Technology		
	Mechanical Technology		

Challenges are presented in Activity Sheets. Activity Sheets display the Specific Learning Outcomes of the activity, the Context which gives rise to identified problems and the particular Challenge which is to be put to the students in their groups. In some cases, a Challenge has more than one element representative of either varying levels of difficulty or complexity or the need to employ different skill sets. The use of Activity Sheets and Challenges embedded in authentic, real life contexts to deliver our content is linked to the philosophy of education which underpins our teaching and learning approaches.

Philosophical Statement Underpinning the Teaching of Technology Education

The designers and developers of Tech Ed believe that all learners have the ability to achieve their full potential, intellectually, emotionally and socially. When exposed to environmental and culturally relevant challenges, they are able to develop and utilize technical and technological knowledge, problem-solving skills, creative and critical thinking skills, and attitudes of enquiry, self-motivation and confidence. These knowledge bases, skills and enterprising attitudes will ensure that students of Tech Ed are equipped to participate in teamwork activities as well as vocational pathways that meet their talents and interests. The graduates of the Tech Ed experience will make positive contributions to the complex and information-driven economy and society of the 21st century.

Vision for Technology Education Implementation

Tech Ed students are technologically literate and socially and culturally well-adjusted, made ready for the achievement of their full potential, as creative, innovative, competent, and productive citizens with a deep love for fellow citizens and our country. Tech Ed teachers are motivated, confident, facilitative, participative, imaginative and resourceful, willing to engage in continued research and making best use of the Tech Ed curriculum guidelines. Tech Ed curriculum documents are inventive, detailed, clear, cohesive, teacher and student friendly, and therefore easily implemented.

Key Definitions in Technology Education

There are many definitions related to the study of technology. Below you will find key terms and definitions that are used by the designers and developers of the revised 2014 Tech Ed curriculum.

Technology - 1. Human innovation in action that involves the generation of knowledge and processes to develop systems that solve problems and extend human capabilities.
2. The innovation, change, or modification of the natural environment to satisfy perceived human needs and wants.

Technology Education – An interdisciplinary field of study which provides opportunities for students to discover and apply, through their own efforts, the processes and knowledge needed to solve problems and extend human capabilities.

Technological Literacy - The ability to use, manage, understand, and assess technology.

Expected General Learning Outcomes

As a result of their exposure to the curriculum, students will:

1. acquire and demonstrate knowledge and understanding of the principles, processes, and products of technology;
2. research, identify, and evaluate information to solve problems related to the design and construction of systems and products in technology education;
3. develop responsibility for, and understanding of, the impact and consequences of the application of technology including, the appropriate selection and safe use of tools and equipment;
4. develop sensitivity to value issues in technology, and understand its relationship to human society;
5. develop an appreciation of the impact of lifestyle choices on personal health and the environment;
6. develop respect and appreciation for the fragile natural environment with the safe use of materials and the disposal of unwanted waste;
7. evaluate the products and systems in technology for functional use, economy, and efficiency;
8. demonstrate respect and appreciation for fellow citizens;
9. communicate and share the insights, solutions, strategies, and decision rules acquired from one's experience of technology education;
10. develop an awareness of, and appropriate response to, technological design and functionality;
11. develop the ability to use our local resources creatively;
12. develop the attitudes and abilities of efficient producers and/or consumers of technological goods and services including products that reflect our cultural diversity;
13. develop creative, aesthetic, and entrepreneurial solutions to problems.

Outline of Curriculum Content

The following Section of this Curriculum Guide contains four (4) Sub-sections outlining in alphabetical order, the components and sub-components focused on, in this, the third version of the Tech Ed curriculum for Trinidad and Tobago. Each sub-section begins by providing working definitions which are specific to the relevant component and its sub-components. Each sub-section contains a minimum of nine (9) Activity Sheets which ensures representative Challenges within all of the fourteen (14) sub-components. The Section culminates in a Framework which summarises the Content, Expected Outcomes, Teaching and Learning Strategies and suggested resources of the 2014 Technology Education Curriculum.

PART 3

Curriculum Content

Biological Technologies

Biological Technologies

The Biological Technologies component of the Technology Education curriculum provides students with opportunities to use biological systems and related technologies to solve problems related to agriculture, food, health, and the environment in a sustainable and environmentally friendly manner. Students will be challenged to create new products or modify existing ones to improve the quality of life. In this curriculum, the component, Biological Technologies consists of three (3) sub-components, namely: **Agricultural Technology**, **Environmental Management Technology**, and **Health and Wellness Technology**.

Agricultural Technology: This sub-component focuses on the use of technology to improve the efficiency of crop and animal production. It will also include the use of living organisms or parts of organisms to make or modify organisms, biological systems, and products for practical purposes.

Environmental Management Technology: This sub-component involves the use of technology to assess and manage the effects of man's action on the environment.

Health and Wellness Technology: This sub-component involves the use of technology to assist in health and wellness management. It focuses on methods of assessing the health of individuals with a view to promoting awareness of healthy lifestyles as well as intervention strategies to manage health issues.

ACTIVITIES IN BIOLOGICAL TECHNOLOGIES

- Agricultural Technology
- Environmental Management Technology
- Health And Wellness Technology

Sub-component: **Agricultural Technology**

Activity # 1: *Treat Me Nice*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify local produce with potential for post-harvest management.
2. identify suitable post-harvest techniques.
3. select a suitable post-harvest technique for the identified local produce.
4. identify materials needed for the post-harvest technique for the identified produce.
5. develop a food product using an appropriate post-harvest technique.
6. evaluate the chosen post-harvest technique for effectiveness.

Context:

In Trinidad and Tobago, the supply of fresh local produce is inconsistent. The shelf life of these agricultural produce can be extended through appropriate post-harvest techniques. These techniques are designed to maintain or enhance the quality of the product making it readily marketable.

Challenge:

Your group is required to extend the shelf life of a local agricultural produce using an appropriate post-harvest technique and prepare a report on your findings.

The product should:

- have a shelf life of at least seven (7) days.
- retain at least 80% of its original color.
- retain at least 80% of its texture (firmness).
- cost no more than \$40.00.

The report should reflect descriptions of:

- the post-harvest technique used.
- the findings as related to shelf life, color and texture.
- effectiveness of the post-harvest technique used.
- recommendations.

Sub-component: **Agricultural Technology**

Activity # 2: *Look! No Soil*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify different types of soil-less media.
2. identify short-term crops that can be grown on soil-less media.
3. select a short-term crop that can be grown on a soil-less media.
4. prepare a soil-less medium from local materials.
5. design a system for growing a short-term crop using the soil-less medium.
6. construct the system for growing the short-term crop.
7. grow and maintain the selected short-term crop from transplanting to harvesting.
8. harvest the crop at correct stage of development.

Context:

In Trinidad and Tobago, many homeowners are interested in growing vegetables and condiments for home use. Apart from having a ready supply of fresh vegetables and condiments, home gardening is considered a leisure-time activity that helps people to relax. However, many homeowners find it difficult to grow crops because of poor soil conditions.

Challenge:

Your group is required to design and implement a system to grow a short-term crop using a soil-less medium.

The system should

- be environmentally friendly.
- be made from at least two (2) local materials.
- occupy an area of approximately one square metre.
- cost no more than \$40.00.

Sub-component: Agricultural Technology

Activity # 3: Pretty Fishy

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify suitable species of ornamental fishes for marketing locally.
2. design a system for rearing ornamental fishes.
3. determine materials needed to set up the system.
4. construct the system for rearing the selected ornamental fishes.
5. monitor and manage water quality during production.
6. rear ornamental fishes for commercial production.
7. identify marketable stage for selected fish species
8. identify business opportunities in ornamental fish rearing.

Context:

Fish can be reared for ornamental purposes. There is a high demand for ornamental fishes in the local and foreign markets. This can be a profitable business provided that fish farmers can successfully rear healthy fishes.

Challenge:

Your group is required to design and construct a system to rear one or more species of ornamental fish to marketable age.

The system should:

- be made from recyclable materials.
- provide good growing conditions for the selected specie.
- cost no more than \$40.00.

The fishes should:

- display growth and development.
- show good physical characteristics.
- show a loss of less than 20% of starter population.

Sub-component: **Environmental Management Technology**

Activity #1: *How Beautiful!*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify an area in the school for beautification.
2. design and sketch a plan to beautify the selected area.
3. identify appropriate plants for the area.
4. identify materials needed for implementation of the plan.
5. decorate the area according to plan.

Context:

Research has shown that a pleasant environment is conducive to learning and reduces aggressive behaviors. Consequently, the Ministry of Education is on a school beautification drive.

Challenge:

Your group is required to develop and implement a beautification plan for a selected area in your school.

The activity should:

- enhance the look of the school environment.
- include at least five (5) types of suitable plants.
- include at least three (3) decorative items made from recycled material.
- cost no more than \$40.00.

Sub-component: **Environmental Management Technology**

Activity #2: *Crystal Clear*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. define the term purified/potable water.
2. explain the importance of purified/potable water.
3. state the characteristics of purified/potable water.
4. design and sketch a water purification system.
5. make a water purification system.
6. produce water that is safe to drink.

Context:

In times of disasters e.g. hurricanes, earthquakes and even in regular household use, small particles and water discolouration can make us suspicious about the purity of water that we consume.

Challenge:

Your group is required to design and make a system for purifying water.

The system should:

- produce water suitable for human consumption.
- incorporate reusable materials.
- cost no more than \$40.00.

Sub-component: **Environmental Management Technology**

Activity # 3: *Protect Our Lands*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify different types of soil conservation methods.
2. match soil conservation methods to different types of soil erosion.
3. identify different types of communication media.
4. design a presentation to demonstrate soil conservation methods.
5. produce an educational presentation.
6. make a model to demonstrate soil conservation.

Context:

One of the problems affecting the Caribbean is soil erosion. When land is left bare due to bush fires and land clearing for agricultural purposes, then valuable top soil is washed away. In addition to this, erosion by water can lead to silting of rivers, clogging of drains and flooding. For the farmer, this can result in poor crop growth and reduced yields.

Challenge:

Your group is required to design and make a model to demonstrate the application of an appropriate soil conservation method to solve a selected soil erosion problem. The model should be accompanied by a presentation explaining how the method works.

The model should:

- be at least 60cm x 60cm.
- be made from reusable materials.
- be scaled properly.
- cost no more than \$ 40.00.

The presentation should be informative.

Sub-component: **Health and Wellness Technology**

Activity #1: *A Fun Day at School*

Specific Learning Outcomes:

At the end of this activity students should be able to:

1. explain the concept of health and wellness.
2. create a health and wellness theme.
3. research five (5) physical activities that would allow for an increase in the number of calories burned.
4. develop menus for healthy meals or snacks.
5. calculate the number of calories for menus.
6. design a layout plan of activities.
7. communicate plan to an identified audience.

Context:

Research has shown that a lack of physical activity and poor meal choices results in a higher risk of developing non-communicable diseases e.g. obesity, diabetes, etc. in children.

Challenge:

Your group is required to present a plan for a health and wellness day for your school.

The plan must include

- a health and wellness theme.
- five (5) physical activities that would burn at least 84 calories.
- calculate the number of calories in two (2) healthy meals.
- determine the number of calories in two snacks served at the Health and Wellness Day.

Sub-component: **Health and Wellness Technology**

Activity #2: *Health Check-up*

Specific Learning Outcomes:

At the end of this activity, the students should be able to:

1. identify basic criteria for assessing health.
2. explain at least three (3) non-communicable diseases.
3. use appropriate equipment competently.
4. record health parameters using appropriate systems.
5. use health information to assess health.

Context:

A leading Caribbean health researcher stated, “We cannot build enough hospitals and train enough doctors to address non-communicable diseases in the future!” (Teelucksingh 2014 – direct communication) Persons knowing their health status are the first intervention in addressing these concerns.

Challenge:

- a. Your group is required to investigate and determine the health status of your group members using appropriate methods.

The method of investigation should:

- be non-invasive.
- be simple, safe and easy to use.
- use appropriate equipment.

- b. Prepare material to inform classmates on at least three (3) non-communicable diseases.

The material should:

- be innovative.
- increase awareness.
- encourage preventative actions.
- inform on possible treatment option.
- include visual aids.

Sub-component: Health and Wellness Technology

Activity #3: *Eat what, when?*

Specific Learning Outcomes:

At the end of this activity, the students should be able to:

1. identify the non-communicable diseases associated with being overweight.
2. use a system for recording foods consumed over a given period.
3. perform calculations for estimating the calorific value of meals.
4. read and interpret food labels.
5. develop meal plans for addressing issues of overweight/obesity.
6. adhere to the principles of proper meal planning.

Context:

In Trinidad and Tobago, research has shown that many school-aged children are overweight and even obese. This is a serious health problem.

Challenge:

Your group is required to:

- a. Plan and organize an awareness campaign to sensitize the students in your class on the dangers associated with being overweight and the benefits of having healthy eating habits. The campaign should:
 - be innovative.
 - include one (1) form of user friendly material.
 - be effective.
- b. Develop a meal plan for one (1) of the following: an Overweight Individual, an Obese Individual, a Morbidly Obese individual.

The meal plan should:

- match the calorific needs of the selection.
- include all meals and snacks for one (1) day.
- include all the food groups.
- utilize the principles of meal planning.

Engineering Technologies

Engineering Technologies

The Engineering Technologies component will engage students in developing solutions to problems through accessing concepts and skills such as planning, designing, drawing, processing, basic computer programming (coding), constructing, finishing, manufacturing, and maintenance. Students will be exposed to relevant technologies and their effective use in the production of a variety of items. The sub-components require students to use tools and equipment safely in the execution of their activities and while working with each other. The component Engineering Technologies is divided into five (5) sub components, namely: **Automation Technology, Building Technology, Design Technology, Electrical and Electronic Technology and Mechanical Technology.**

Automation Technology: This sub-component exposes students to some of the technical and computer-based systems. Students are introduced to the use of various processes for operating machines and control systems in areas such as Robotics, Applications (apps) Development, Animation with an emphasis on game development, Computer Numerical Control (CNC) Machines and 3D Design and Printing.

Building Technology: This sub-component involves the creative use of traditional and new building/construction materials in the planning and execution of solutions to problems in the built environment. Students will utilize measurement and manipulative skills to construct models of buildings and parts thereof, internal storage items and simple furniture pieces.

Design Technology: This sub-component involves the development of an understanding and appreciation that design skills are integral to innovation and creation of new products or redesign of old products. Designing and drawing is also a traditional form of communication which results in creative communication items. Students will learn and appreciate the use of sketching and design skills to communicate early ideas for new or redesigned products. Additionally, they will learn to manipulate the use of measurement, basic geometric shapes and construction ideas to create models, graphical items and simple layouts for construction and furniture pieces.

Electrical and Electronic Technology: This sub-component involves students in the design, creation, installation and testing of simple electrical and electronic circuits. Students will build circuits incorporating the use of recycled materials from items such as computers, toys and appliances. Students will build models of devices and systems to generate electrical energy from renewable energy sources. In addition, students will appreciate the impact of traditional energy sources on the environment.

Mechanical Technology: This sub-component involves the application of knowledge and skills to plan, design, and use materials in the manufacture of quality products for the consumer, and to also solve the problems of mankind. This mechanical sub-component will allow students to be exposed to the different types of ferrous and non-ferrous metals in the development of these products. Students will also be engaged in the use of tools and equipment in a safe manner to fabricate, construct, and perform basic machining operations, as well as to interact and troubleshoot with small machines and engines.

ACTIVITIES IN ENGINEERING TECHNOLOGIES

- Automation Technology
- Building Technology
- Design Technology
- Electrical And Electronic Technology
- Mechanical Technology

Sub-component: **Automation Technology**

Activity #1: *The Robot and the Maze*

Specific Learning Outcomes:

At the end of the activity, students should be able to:

1. design and sketch a maze.
2. construct a maze.
3. construct a maze that can be disassembled, assembled, easily stored and transported.
4. choose the appropriate sensors for the task.
5. construct a robot using a robotic kit.
6. demonstrate the navigation of a robot through the maze.

Context:

In an emergency, search and rescue teams may need to navigate around dangerous objects. A safe option would be to use a robot to survey the environment.

Challenge:

Your group is required to design and construct a maze and robot.

The maze must:

- fit in a space approximately 1m width by 2m length.
- include at least 3 turns and 2 dead-ends.
- be easily disassembled and assembled in no more than 30 mins.
- be easily transported and stored.

The robot must:

- utilize at least one type of sensor.
- navigate through the maze in at least 2 mins.

Sub-component: **Automation Technology**

Activity #2: *Simple Robotic Arm*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design a robotic arm.
2. construct a robotic arm.
3. identify types of simple machines.
4. demonstrate the use of at least one simple machine.
5. demonstrate the use of a simple robotic arm.
6. utilize principles of simple machines.

Context:

In life, we often have to move or lift heavy loads. Over time we have moved from using simple machines which require manual control to automated systems for e.g. Robotics.

Challenge:

Your group is required to create a robotic arm that is able to:

- lift a weight of at least 0.25kg.
- raise the weight to at least 30cm in height.
- move the weight through an angle of 180°.
- cost no more than \$40.00.

Sub-component: **Automation Technology**

Activity #3: *Create My APP*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch a mobile application (app) for an Android device.
2. create a mobile app for an Android device using an app ICT tool.
3. apply the software/system (engineering) design process.
4. identify an issue affecting students at your school.
5. identify a solution to an issue affecting students at your school.

Context:

Mobile apps are designed to make your life easier, by using the latest e-technologies.

Individuals can create mobile apps using simple ICT tools.

Challenge:

Design and create a mobile app for an Android device on an issue that would help persons in your environment.

The app must be:

- easy to use.
- collaborative.
- attractive and
- fun.

Sub-component: **Automation Technology**

Activity #4: *CNC Machine Simulator*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch an object that can be used to display jewelry.
2. create a programme for the object using a CNC Machine simulator ICT tool.
3. create an image of the object using CNC Machine simulator ICT tool.

Context:

Training in the use of CNC Machines can be done through the use of Virtual Software. The same product can be produced over a period of time as a result of precisely programmed commands on CNC machines.

Challenge:

Design and create a virtual model of the object that can be used to display jewelry using an ICT tool that simulates CNC machines. The object must be

- no greater than 30cm in width and 30cm in length and
- easy to use.

Sub-component: **Automation Technology**

Activity #5: *Prototype Simulation*

Specific Learning Outcomes

At the end of this activity, students should be able to:

1. design and sketch a device that can be used to fasten two pieces of materials together.
2. select the appropriate ICT tool.
3. programme a virtual 3D printer.

Context:

Product ideas may need modification to attain full functionality. Creating prototypes can be costly. Virtual 3D printing can be used to improve the testing and modification processes in developing products.

Challenge:

Your group is required to

- design a device to fasten two pieces of materials together.
- select and use an appropriate software to simulate the design as it would be printed in a 3D printer.
- The virtual prototype should be no smaller than 0.5cm x 0.5cm x 0.5cm or no larger than 10cm x 10cm x 10cm.

Sub-component: Building Technology

Activity #1: The Lifting Device

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch a lifting device.
2. list three types of wood which can be used in the construction of a lifting device.
3. select appropriate tools and equipment to be used in the construction of a lifting device.
4. identify four (4) safety rules and procedures when operating tools and equipment.
5. construct the lifting device.
6. demonstrate the use of metric scales.
7. ensure the safety of the bicycle when being lifted.

Context:

You are living on the top floor of an apartment building and the proud owner of an expensive mountain bicycle with the poles for stunts. In order to prevent your bicycle from being stolen, you need to carry it upstairs to your room every night.

Challenge:

Your group is required to design and construct a scaled model of a simple device which can be used to lift your bicycle to the top floor easily and safely.

The device should:

- lift a minimum weight of eight (8.0) kilograms.
- raise the bicycle to a height of 4.0 metres off the ground floor.
- be easy to use.
- cost no more than \$40.00.

Sub-component: Building Technology

Activity #2 Commemorative Item

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch a commemorative item.
2. list three types of wood which can be used in the construction of a commemorative item.
3. select appropriate tools and equipment to be used in the construction of a commemorative item.
4. identify four (4) safety rules and procedures when operating tools and equipment.
5. construct the commemorative item.
6. finish the commemorative item appropriately.

Context:

Your school has decided to distribute a commemorative item to honour persons who have worked all of the twenty (20) years of existence of the institution. The organizing committee has decided that there will be a half day of celebrations to mark the occasion. The committee would like to distribute an item for the occasion but does not have adequate funds to purchase for all awardees.

Challenge:

Your group is required to design and construct an item to commemorate this special occasion.

The item should:-

- be no larger than 150mm high and 100mm wide.
- be constructed of wood.
- be easy to use.
- be highly polished.
- cost no more than \$40.00.

Sub-component: **Building Technology**

Activity #3: *Furniture Construction*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch a piece of furniture.
2. list three types of wood which can be used in the construction of furniture.
3. select appropriate tools and equipment to be used in the construction of furniture.
4. identify four (4) safety rules and procedures when operating tools and equipment.
5. construct the piece of furniture.

Context:

House fires can have devastating consequences on the lives of persons whenever it happens. Additionally, items which are destroyed during fires are expensive to replace.

Challenge:

Your group is required to design and construct a piece of furniture for the kitchen to replace what was lost in the fire.

The item should:

- be no less than 45 cm square.
- accommodate a minimum weight of 4.0 kg.
- utilize at least two types of materials.
- should cost no more than \$40.00.

Sub-component: **Design Technology**

Activity #1: *Sketching designs*

Specific learning outcomes:

At the end of this activity, students should be able to:

1. communicate ideas through sketching.
2. select appropriate equipment and materials used for sketching.
3. apply principles and techniques of sketching.

Context:

In an emergency, it is difficult to locate basic First Aid items because different ones may be stored at various locations all around the home. Persons may use kitchen countertops, bathroom cupboards and bedroom spaces. There is a large market for efficient solutions for this problem.

Challenge:

Your group is the design team for a large manufacturer. Your team is required to communicate to the Chief Executive Officer your ideas in the form of sketches for a design of a storage item to store basic First Aid items.

The sketches should:

- fit on a letter size (21.59cm by 27.94cm) sheet of paper (1 sketch per sheet).
- show three different stages of the idea or
- show three different ideas.
- show all parts as clearly as possible.

Sub-component: **Design Technology**

Activity #2: *Kite design and flying*

Specific learning outcomes:

At the end of this activity, students should be able to:

1. recognize and construct geometrical shapes.
2. design and sketch ideas for your kite.
3. manipulate measuring equipment.
4. construct kite.
5. observe safety rules for kite flying.
6. assess the advantages and disadvantages of kite flying on the environment.

Context:

Traditionally at Easter time in the Caribbean, kite flying is a national pastime. Some countries in which this is very popular include Trinidad and Tobago and Barbados. Activities are well organized and there may be prize-money for participants.

Challenge:

Your group is required to design and produce a kite to be hoisted at a kite making and kite-flying activity.

The kite should:

- utilize at least one geometric shape (triangles, quadrilaterals, polygons).
- be no less than 30cm × 30cm nor larger than 90cm × 90cm.
- incorporate at least three colours.
- be able to stay higher than a one storey building in the air for more than 5 minutes.
- cost no more than \$40.00.

Sub-component: **Design Technology**

Activity #3: *Garden design & Model*

Specific learning outcomes:

At the end of this activity, students should be able to:

1. identify four types of geometric shapes.
2. design and sketch ideas for design.
3. manipulate measuring tools.
4. make the model of the garden.

Context:

As the population grows, there is less land space for homeowners to utilize. One home owner has a piece of land that is approximately 3m by 4m on the side of the house and wishes to use it for either a kitchen or flower garden.

Challenge:

Your group is required to design and make a model of the kitchen/flower garden.

Your design/model should:

- utilize at least three (3) different geometric shapes to represent plants.
- be scaled to give a realistic representation.
- cost no more than \$40.00.

Sub-component: **Electrical and Electronic Technology**

Activity #1: *One on, One off*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. research different types of lighting circuits.
2. design and sketch the appropriate lighting circuit.
3. use correct colour code for wiring electrical devices.
4. connect circuit properly.
5. test circuit for functionality.

Context:

The ability to turn on a lighting device from more than one location can prove to be very convenient. It can reduce the risk of injury when the device is used to illuminate a stairway in the night.

Challenge:

Your group is required to design, build and test an electrical circuit that may be used to activate a lighting device from two locations.

The model should:

- be safe to use.
- be functional.
- cost no more than \$40.00.

Sub-component: **Electrical and Electronic Technology**

Activity #2: *It's a Breeze!*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch an appropriate design of a cooling device.
2. salvage electronic components.
3. connect components.
4. test electronic circuits.

Context:

When it is humid, the body may become sweaty and sticky. Spectators at outdoor sporting events often seek means to cool themselves.

Challenge:

Your group is required to design and make a solar powered device that can be used to cool the face.

The device should:

- be lightweight.
- be compact.
- be portable.
- cost no more than \$40.00.

Sub-component: **Electrical and Electronic Technology**

Activity #3: *Star Light, Star Bright*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch lighting circuits appropriate to selected wiring configurations.
2. apply the three (3) relevant codes for lighting circuits (Trinidad and Tobago Bureau of Standards - TTBS).
3. connect electrical receptacles.
4. compare wiring configurations.

Context:

During celebrations, people normally decorate their homes using multiple strings of coloured lights. These strings of lights are not complicated to construct and persons can be taught to make them, using different wiring configurations.

Challenge:

Your group is required to design and make strings of lights utilising at least two (2) types of wiring configurations and prepare a brief report.

Your products should:

- use reusable materials.
- cost no more than \$40.00.

Your report should

- be no more than 200 words.
- compare the characteristics of each type of wiring configuration used.

Sub-component: **Electrical and Electronic Technology**

Activity #4: *Sound the Alarm*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. conduct research on different types of sensors and audio devices.
2. design and sketch an appropriate circuit design.
3. select an appropriate sensor and audio device.
4. build alarm circuit.
5. test alarm circuit.

Context:

Breaking and entering is a common problem in secondary schools which leads to a loss of valuable items. An alarm system acts as a deterrent to potential thieves.

Challenge:

Your group is required to design and build an alarm circuit that would sound when an unauthorized person enters a selected space.

The audio alarm should:

- be neatly wired.
- sound within seven (7) seconds after the sensor is activated.
- cost no more than \$40.00.

Sub-component: **Mechanical Technology**

Activity #1: *Chewing Gum Scraper/Tool*

Specific Learning Outcomes

At the end of this activity, students should be able to:

1. design and sketch a design of a tool to remove chewing gum from the floor.
2. select suitable materials to construct the tool.
3. choose appropriate production processes to be used in the construction of the tool.
4. demonstrate skills in the safe use of basic hand tools and equipment.

Context:

At your school, despite the rule, students chew gum and dispose of it in an unsanitary manner. Gum stuck anywhere is very unsightly and may be damaging to personal property.

Challenge:

Your group is required to design and construct a tool which can be used to easily remove stuck gum.

The tool should:

- be safe and easy to use.
- weigh no more than one (1) kilogram (kg).
- cost no more than \$40.00.

Sub-component: **Mechanical Technology**

Activity #2: *The Organizer*

Specific Learning Outcomes

At the end of the activity, students should be able to:

1. design and sketch a design of a product to organize and store small items.
2. select suitable materials to construct the product.
3. choose appropriate production processes to be used in the construction of the item.
4. demonstrate skills in the safe use of basic hand tools and equipment.

Context:

Sometimes in the rush to do our work we constantly misplace our keys, pens, pencils, and other small items. It would be nice to be able to find them quickly when we want to use them.

Challenge:

Your group is required to design and construct a product to store small items.

The product should:

- have at least three differently sized compartments.
- allow for easy and safe removal of items.
- cost no more than \$40.00.

Sub-component: **Mechanical Technology**

Activity #3: *Garbage Storage Device*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. design and sketch a device to store household waste/garbage.
2. select suitable materials to construct the device.
3. perform three (3) major operations to construct the storage device.
4. demonstrate skills in the safe use of basic hand tools and equipment.

Context:

Garbage storage and disposal should be taken seriously. Some citizens do not demonstrate proper handling of their household waste/garbage nor proper sorting of garbage.

Challenge:

Basic: Students are required to design and make a storage device that will be able to secure household waste/garbage in a safe manner.

Advanced: Students are required to design and make a storage device that will allow for sorting of household waste/garbage into three categories.

The device should be:

- made from a suitable material.
- able to store at least 5kgs of household waste/garbage.
- properly secured.
- safe and easy to use.

Sub-component: **Mechanical Technology**

Activity #4: *Evolution of Engines*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify different types of engines.
2. explain how selected engines operate.
3. conduct research on the evolution of engines within the selected period.
4. conduct research on how engines have contributed to human development.
5. organize an exhibition.

Context:

During 1800-2000 the world has moved from animal to engines as sources of horsepower.

Over the years, mankind has invented many kinds of engines which have contributed to human activities. Understanding the mechanical processes of an engine facilitated newer inventions and rapid human development.

Challenge:

Your group is required to produce

- a. a mini exhibition showing the evolution of engine development over one of the following 50-year periods: 1850-1900, 1900-1950 or 1950-2000.

Your exhibition should:

- have at least 2 models of engine types or engine modifications.
 - have at least two (2) types of text-based materials.
 - occupy a space of no more than 90cm × 120cm.
- b. a research paper of at least 150 words on how engines have contributed to human development.

Sub-component: **Mechanical Technology**

Activity #5: *Careers in Engineering Technologies*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify the careers available in their specific occupational area (MET, Auto, Welding Building etc.).
2. demonstrate an awareness of careers in their occupational area.

Context:

An awareness of the types of careers available in various occupational areas will enable students to make proper subject choices. Career fairs help to develop that awareness, but often do not represent careers within the engineering technologies field adequately.

Challenge:

Your group is required to prepare a virtual presentation highlighting at least five (5) career possibilities in the fields of engineering technologies.

Your presentation should be

- no longer than twenty (20) minutes.
- informative.
- well organized.

Entrepreneurship

Entrepreneurship

The **Entrepreneurship** component of the Technology Education curriculum responds to the demand that students understand the value, ways and skills required to convert the ideas and products developed within and outside the Tech Ed classroom into a viable business. Students will be able to identify opportunities for profit-making, recognize the business potential of activities in the other components of the Technology Education curriculum, prepare product-focused business plans, engage in business-related activities and prepare relevant business documents and records that document various aspects of business life. In this curriculum, the component, Entrepreneurship consists of the three (3) sub-components, namely: **Business Planning, Document Preparation and Record-keeping.**

Business planning: This sub-component involves students in guided discovery of selected business terms, forms, functions and skills, with the aim of enabling teams in developing simple business plans for one or more of solutions created in other components. Students will also be exposed to entrepreneurial environments that will build the necessary perspectives and attitudes typical of successful business people.

Document preparation: This sub-component involves student preparation and management of key business documents which are used in various personal, and office environments. Students will use these documents in appropriate circumstances as they translate enterprising ideas to viable entities.

Record-keeping: This sub-component involves student preparation of key records needed in operationalising their business venture. The records considered as key for successful business ventures are Minutes of Meetings and basic accounting records.

ACTIVITIES IN ENTREPRENEURSHIP

- Business Planning
- Document Preparation
- Record-Keeping

Sub-component: Business Planning

Activity #1: *Knowing your Entrepreneurial Mindset*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. conduct a SWOT analysis.
2. describe their personal SWOT profile.
3. use visual means to communicate a personal SWOT profile.

Context:

Entrepreneurs have a particular mindset that allows them to recognize potential business opportunities. One way to discover whether one has an entrepreneurial mindset is to check one's personal business SWOT profile.

Challenge:

Your group is required to

- find or develop a SWOT questionnaire.
- determine the personal SWOT profile of each group member.
- create a portfolio of visuals representing the entrepreneurial mindset of group members.

Sub-component: **Business Planning**

Activity #2: *Moving from Idea to Business Plan*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. select a solution that has the potential for development as a business.
2. list the components and prepare an operations plan for your selected product/service.
3. list the components and prepare a marketing plan for your selected product/service.

Context:

The aim of most challenges in technology education is to produce solutions that can become viable business ideas. The entrepreneur is the person who recognizes a potential business idea and takes the risk of investing and organizing with the hope of making the effort profitable. This business idea must be presented as a business plan when funding/financing is being sought from investors or through loans.

Challenge:

Your group is required to

- choose any solution from a technology education challenge.
- submit a paragraph to argue why the solution has potential as a business opportunity.
- create and present one of the following plans for your solution to a group of investors.
 - An operations plan.
 - A marketing plan.

Sub-component: Business Planning

Activity #3: *Marketing your Designs*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. list the activities involved in market research.
2. create a simple market research plan.
3. design a market research instrument.
4. conduct simple market research activities.
5. match marketing strategy to a given product/service.
6. create marketing media with and without ICTs.

Context:

You have designed a product/service that you would like to mass produce and sell. Market research will help you decide which consumers you should target and the most effective marketing strategy to be employed.

Challenge:

Your group is required to:

- Create an appropriate marketing plan for your selected product/service.
Your plan should be
 - based on your market research.
 - include at least one (1) comprehensive marketing strategy.
- Create two (2) media for your message to encourage consumers to purchase your product/service. Only one (1) of your media must include ICTs.

Sub-component: Business Planning

Activity #4: *Establishing a Business*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. list five (5) things to consider in planning and establishing a business.
2. describe five (5) considerations in planning and establishing a business.

Context:

The entrepreneur must consider the social, legal, economic, political and technological impact when planning to establish a business.

Challenge:

Your group is required to produce an item which potential entrepreneurs can consult easily and quickly.

Your item should

- provide information on establishing at least three (3) types of business.
- provide information on sources of finance for each type of business.
- include a diagrammatic representation of the steps to be taken in establishing the selected type.

Sub-component: Business planning

Activity #5: *My Professional Image*

Specific Learning Outcomes:

By the end of this activity students should be able to

1. state why one's manner of dress is part of a professional image.
2. list at least two (2) codes used for dressing for the workplace.
3. explain how dress code relates to professional image.
4. match dress codes with appropriate settings.
5. display at least one (1) professional image suitable for a selected job.

Context:

The entrepreneur's appearance is one way he/she communicates a "professional image", that is, what he or she wants others to think about him/or her and the business. Entrepreneurs may have to teach employees about the desired forms of dress in a way that motivates them to comply.

Challenge:

Your group is required to make a presentation, in a creative and innovative manner, an item which represents a professional image for any one (1) selected job in your enterprise.

The item should

- have moveable parts.
- portray a professional image that matches the selected job.
- cost less than \$40.00

Sub-component: Document Preparation

Activity #1: *Completing Forms*

Specific Learning Outcomes:

At the end of this activity, students should be able to

1. list one (1) statutory form which employees submit to relevant authorities.
2. list at least (1) form which an employee may submit to an employer.
3. complete forms.
4. organize a training activity.

Context:

Applicants are required to complete and submit forms to relevant authorities. Several of these forms are required by law. Persons may experience challenges in accurately completing these forms.

Challenge:

Your group is required to

- (i) Prepare a guide for prospective applicants, which include at least
 - one (1) copy of a form that they must complete in preparation for a job,
 - one (1) form that is required by law and
 - one (1) other form.
- (ii) Organize a session to train your classmates to complete your examples of forms.

Sub-component: Document Preparation

Activity #2: Job Application

Specific Learning Outcomes:

At the end of this activity, students should be able to

1. design a job application form.
2. justify the information to be gathered from a job application form.

Context:

Upon completing one of the challenges in the technology education curriculum you became an entrepreneur producing a product. Your business is now growing and expanding and you need to employ workers. These workers must meet the basic regulatory requirements to become employees.

Challenge:

Your group is required to

- Design a job application form which includes a minimum of ten (10) essential items for any named position in one of the functional areas in your identified business enterprise.
- Prepare a report giving one reason for each item you have chosen to include on your job application form.

Sub-component: Document Preparation

Activity #3: *Hiring Practice*

Specific Learning Outcomes:

By the end of this activity, students will be able to

1. prepare job advertisements using at least two (2) different media.
2. devise a method to select persons for a job.
3. prepare form letters for a particular purpose.

Context:

When entrepreneurs wish to hire persons, they may place advertisements in various media. However, there may be too many applications for any one (1) position. The entrepreneur must find a way to determine who gets the position. Afterwards both successful and unsuccessful applicants should be formally notified.

Challenge:

Your group is required to

- create an advertisement for a named position using two (2) different media.
- devise a method to decide which person will be hired for the position.
- inform the successful and unsuccessful candidates using an appropriate medium.

Sub-component: **Document Management**

Activity #4: *Document Retrieval*

Specific Learning Outcomes:

By the end of this activity, students should be able to

1. list examples of business-related documents.
2. identify items and equipment used in storage and retrieval systems.
3. devise a method to store and retrieve documents easily.
4. demonstrate with the use of examples how the method works.

Context:

Entrepreneurs need to keep business records safe. They also must keep up to date with the latest information in their industry by attending seminars and conferences. A system to store and retrieve documents easily is critical for efficient business management.

Challenge:

Your group is required to

- devise a system that makes it easy to store and retrieve documents.
- create a training package to demonstrate how the system works.

Sub-component: Record-keeping

Activity #1: *Recording Information from Meetings*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. prepare a template to record group meetings.
2. use a template to record group meetings.
3. present at least one Minutes of meeting in acceptable form.
4. demonstrate the value of Minutes of meetings.

Context:

Every entrepreneur spends time in meetings with other persons. The record of these meetings, called Minutes, has a number of advantages to both parties.

Challenge:

Your group is required to make a presentation to show your classmates why and how minutes of meetings are prepared.

Your presentation should

- include at least one (1) example of a template that could be used in group meetings to collect meeting information.
- demonstrate clearly the value of keeping records of Minutes.

Sub-component: Record-Keeping

Activity #2: *Recording Business Information as Accounts*

Specific Learning Outcomes:

At the end of this activity, students should be able to

1. write a proposal for a training activity.
2. organize for a training activity.
3. prepare simple accounting records.
4. prepare a training session evaluation report.

Context:

One requirement of any business is to keep accurate accounting records. The end result is often a well-run, profitable business.

Challenge:

Your group is required to:

- produce a training plan for an appropriate number of training sessions for your classmates to support them in keeping good accounting records.
- analyse the results of at least one (1) assessment and write a brief report evaluating one or more training session/s.

Sub-component: Record-Keeping

Activity #3: Proposal Writing

Specific Learning Outcomes:

At the end of this activity, students should be able to

1. define the term proposal.
2. identify items found in a standard proposal.
3. write a proposal for a school-related activity using appropriate media.
4. present your proposal to your classmates.

Context:

Entrepreneurs are sometimes faced with business opportunities, which require the writing of proposals to bring them to realization. Proposal writing requires certain skills that are not difficult to master.

Challenge:

Your group is required to:

Prepare a proposal to organize a school related activity that has profit making potential.

Your proposal should

- be no more than three (3) pages.
- utilize appropriate media.
- include at least four (4) items found in a standard proposal.

Human Ecology

Human Ecology

Human Ecology is a field of study that focuses on personal development and human relationships with family, the community and the environment. Humankind's needs and wants for food, shelter and clothing has been met and exceeded over eons through our ability to design and make a wide variety of items. The Human Ecology component seeks to equip students with the knowledge and skills necessary to meet and exceed the ever-increasing demands of people and society for both tangible and intangible items. In this curriculum, the Human Ecology component is divided into three (3) sub components, namely: **Clothing and Textile Technology, Consumer Technology, and Food Technology.**

Clothing and Textiles Technology: this sub-component involves the application of Textile Science to the production of garments and accessories for personal, household or commercial uses. Students will be exposed to knowledge about the behaviour of various textiles and their uses and utilize basic skills in needlework, garment construction and soft-furnishings.

Consumer Technology: this sub-component involves the application of life skills to the management of personal, family and societal resources. Students will utilize basic manipulative skills used in personal hygiene and also for the realization of a desired image. In addition, students will be made aware of the efficient utilization of resources for the satisfaction of needs within the home and other social places.

Food Technology: this sub-component involves the application of Food Science to the processing, preservation, packaging and distribution of raw material. In addition, students will become aware of the nutritional and physical properties of food components. The safety concerns regarding the handling of foods and equipment will also be addressed.

ACTIVITIES IN HUMAN ECOLOGY

- Clothing And Textiles Technology
- Consumer Technology
- Food Technology

Sub-component: **Clothing and Textiles Technology**

Activity #1: *Fabric Design*

Specific Learning Outcomes:

At the end of the activity, students should be able to:

1. state the characteristics of dyes and paint.
2. state the characteristics of a good fabric design.
3. utilize various methods of fabric design.
4. create a design that fits the selected theme.

Context:

Your school's annual budget has been reduced; therefore, March Past teams are required to reuse their uniforms from previous years.

Challenge:

Your group is required to embellish an old tee shirt for your team utilizing specific fabric designs. The theme of the sports day is "The Colours of the Caribbean".

The item should:

- utilize no less than two colours.
- be relevant to the theme of the sports day.
- be modeled by a member of your group.
- cost no more than \$40.00.

Your group is also required to present the design to the House Captain and convince him/ her as to why this design should be used.

Sub-component: **Clothing and Textiles Technology**

Activity #2: *Textile Technique*

Specific Learning Outcomes:

At the end of the activity, students should be able to:

1. identify four types of embroidery stitches.
2. state the characteristics of embroidery design.
3. design and sketch embroidery patterns.
4. select appropriate tools and equipment.
5. decorate an item using embroidery stitches.

Context:

Humans have decorated their clothing and household items using embroidery techniques. Although, handiness with needle and thread is still a valuable skill, embroidery can now be generated using computer programs.

Challenge:

Your group is required to decorate an item using embroidery.

Your item should:

- be clothing or a household article.
- include no less than two embroidery stitches.
- use no less than three colours.
- cost no more than \$40.00.

Sub-component: **Clothing and Textiles Technology**

Activity #3: *Costume Making*

Specific Learning Outcomes:

At the end of the activity, students should be able to:

1. identify historical events in your country.
2. design and sketch a costume that fits the selected event.
3. state the characteristics of costume design and construction.
4. make a costume.

Context:

Our country has a number of festivals and other occasions in which costumes are an integral part of the celebrations. Beautifully designed costumes display creativity and may also provide viewers with historical data.

Challenge:

Your group is required to design and make a costume that depicts aspects of a historical event in your country which can be displayed in the school's library.

The costumes should:

- have no less than two colours.
- make use of decorative stitching.
- be made from reusable materials.
- cost no more than \$40.00.

Sub-component: **Consumer Technology**

Activity #1: *Developing Beauty Products from Local Plants and its Derivatives*

Specific Learning Outcomes:

At the end of the activity, students should be able to:

1. identify local plants that can be used for medicinal or beauty purposes.
2. identify methods of making herbal products from plant material.
3. develop a herbal product using appropriate methods.
4. develop a test to evaluate the herbal product.
5. package and label herbal products.

Context:

Research has shown that many of our local plants were used by our ancestors for medicinal and beauty purposes. Recently, there has been renewed interest in herbal beauty products, partly because they may have fewer side effects than chemically based products.

Challenge:

Your group is required to make a plant-based beauty product using local plants or its derivatives.

The product should:

- utilize no more than three (3) plant-based materials.
- have an appropriate viscosity.
- maintain its constitution over at least one (1) week.
- cost no more than \$40.00.

Sub-component: **Consumer Technology**

Activity #2: *Out with the old, In with the new*

Specific Learning Outcomes:

At the end of the activity the students should be able to:

1. use the internet and other sources to gather information on recycling.
2. identify materials that could be recycled.
3. state three advantages and disadvantages of recycling.
4. use recycled material to produce household items.

Context:

Irresponsible waste disposal results in many environmental issues such as the clogging of our waterways resulting in flooding. Many items that are disposed of can be recycled to make useful items that could be used in the home.

Challenge:

Your group is required to make use of recyclable materials to create an item that could be used in the home.

The item should be:

- attractive.
- functional.
- durable.
- cost no more than \$40.00.

Sub-component: **Consumer Technologies**

Activity #3: *More room in the Inn*

Specific Learning Outcomes:

At the end of this activity, students should be able to

- describe two (2) learning characteristics of the 1-3 years old child.
- list three (3) of the spatial needs of the 1-3 years old child.
- construct a scaled model of a specialized space suitable for particular learning needs.
- present a report in support of decisions.

Context:

Preschoolers are at stages where they learn by exploring. Parents should be encouraged to devote one part of the home and build a space that will meet some of the learning needs of their 3-4 year old.

Challenge:

Your group is required to construct a scaled model of a child-friendly space, as an example to parents of 1-3 year old toddlers.

Your model should:

- incorporate at least two (2) safety features.
- utilize no less than two colours.
- include at least three (3) appropriate educational features.
- cost no more than \$40.00.

Sub-component: **Food Technology**

Activity #1: *Breakfast on the go*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. list food sources of protein.
2. identify the components of the breakfast pattern.
3. demonstrate basic food preparation skills.
4. prepare food items using breadstuff/cereals.
5. select suitable packaging.

Context:

Breakfast is the most important meal of the day. Research studies have revealed that the most common reason for not having breakfast is time constraints. It is suggested that pre-packaged items will encourage breakfast consumption.

Challenge:

Your group is required to produce a breakfast item that conforms to the breakfast pattern. The item should be packaged to be consumed “on the go”.

The item should be:

- prepared in less than 20 minutes.
- low in fat and sodium.
- suitably packaged.
- cost no more than \$40.00.

Sub-component: **Food Technology**

Activity #2: *Cheap but healthy Dinner meals*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. list at least two food sources of each of the following: protein, carbohydrates, fats, vitamins and minerals.
2. explain the link between food sources and nutritional status and food sources.
3. explain the link between poor eating habits and nutritional status.
4. list the components of the dinner pattern.
5. demonstrate basic food preparation skills.
6. plan a nutritious low-budget meal.
7. prepare a low- budget meal that conforms to the dinner pattern.

Context:

Research has shown a marked increase in non-communicable diseases among school-aged children in Trinidad and Tobago. This appears to be related to poor food choices. In some cases poor food choices are related to the high prices of fruits, vegetables and protein foods.

Challenge:

Your group is required to plan, prepare and serve a nutritious meal for school-aged children that:

- conforms to the dinner pattern.
- is low in fat, sugar and sodium.
- cost no more than \$15.00 per serving.

Sub-component: **Food Technology**

Activity #3: *Fruit for later*

Specific Learning Outcomes:

At the end of this activity, students should be able to:

1. identify ten (10) local fruits.
2. identify three (3) causes of food spoilage.
3. define four (4) terms commonly used in food preservation.
4. describe four methods of preserving food.
5. list five guidelines to follow when selecting fruits and vegetables for preservation.
6. develop a product utilizing any one (1) method of food preservation.

Context:

The Caribbean has many seasonal fruits that are tasty and rich in vitamins and minerals. These fruit trees usually bear more than is utilized during the “in-season” which results in wastage. This wastage can be reduced through a preservation process.

Challenge:

Your group is required to extend the shelf life of a seasonal fruit utilizing at least two (2) methods of preservation. Your product should be accompanied by a brief report that describes the principles of at least three (3) methods of food preservation.

The product should:

- be tasty.
- be appropriately packaged.
- demonstrate a shelf life of over three weeks.
- cost no more than \$40.00.

Conclusion

The antecedents of the Tech Ed curriculum identify it as a product of the technical and vocational education (TVE) sub-system. TVE teachers facilitated its implementation with the support of personnel from the Technical and Vocational Education and Training Unit (TVETU) of the Curriculum Development Division. Training exercises for TVE teachers were enhanced by the development of a Teacher's Training Guide in 2003 (which remained unpublished) and a great deal of training material over the years by officers of the TVETU. For the first time, in this 2014 version, the Curriculum Guide will be accompanied by a comprehensive Technology Education Teachers' Guide which we hope will act as an Instructional Toolkit in support of a more standardized curriculum implementation effort. The Technology Education Teachers' Guide will provide *inter alia*

- information on the teaching and learning theories which guide the Tech Ed curriculum design
- brief discussions on key concepts and pedagogical knowledge and skills applicable to Tech Ed's implementation in the classroom
- Activity Descriptors for each Challenge including suggested resources and in particular online sources of information
- detailed explanations for each element of the Tech Ed Mark Scheme
- suggestions for curriculum adaptations for both advanced and special needs students.

The 2014 version of the Tech Ed curriculum has sought to include other TVE teachers who have valuable knowledge and skills to offer. In particular, the Curriculum Guide provides activities that will involve the teachers of Technical Drawing, Business subjects and Mechanical Engineering areas. All TVE teachers are advised that although the component labelled Information and Communication Technologies (ICT) has been removed, ICT knowledge and skills continue to be key inputs into teacher and student activity in Tech Ed. In addition, both teachers and students are expected to make use of ICT for its varied outputs. Finally as noted before, although most of the fifty (50) Challenges presented here in the 2014 version are new, the Challenges in the earlier versions continue to be available for use in your Tech Ed classroom.

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Appendix 1

EXAMPLE OF INSTRUMENT FOR PERSONAL SWOT ANALYSIS

- ❖ **SWOT** stands for Strengths, Weaknesses, Opportunities and Threats.
 - ❖ Strengths and weaknesses are personal characteristics.
 - ❖ Opportunities and threats are personal perceptions.
 - ❖ If you know your strengths and opportunities you can make good use of them.
 - ❖ If you know, your weaknesses and threats, you can do something about them.
-
- ✓ A personal **SWOT** analysis is a way of discovering your skills, abilities, and interests. You may also discover new things about your habits and circumstances that support or work against your becoming an ENTREPRENEUR.
 - ✓ A number of statements appear in groups below. Carefully read each statement and rate yourself on the following scale according to how truly the statement describes you.

1-False

2-True

3-Very True

1. I can read and write well.
2. I can do basic mathematics operations.
3. I like to talk and interact with people.
4. I like to direct others when we work in teams.
5. I want to have my own business one day.
6. I would give up doing certain things to start a business now.
7. I manage to stay on a task as long as it takes to complete it.
8. I have good attention span for people who are talking.
9. I express my ideas easily
10. I find it easy to make decisions.
11. I have members of my family or friends who have their own business.
12. I have some experience in the world of business.
13. I am responsible.
14. I am organized.
15. I have my family support if I were to start a business
16. I work well with other people.
17. I have an idea for a business right now.
18. I can work hard.
19. I do not let poor grades or reports stop me from trying again.
20. I like to read or hear about successful businesses