Design and Technology Subject Field

Lower Secondary Syllabuses

Practical Skills

Home Economics

Computing

Design and Technology

Papua New Guinea
Department of Education

Issued free to schools by the Department of Education

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Secretary's message

This syllabus is to be used by teachers to teach Lower Secondary students (Grades 9 and 10) subjects in the Design and Technology Subject Field throughout Papua New Guinea. The syllabuses build upon concepts, skills and attitudes from Upper Primary and link to concepts, skills and attitudes in Upper Secondary. They provide a sound foundation for further learning.

The Lower Secondary Design and Technology Subject Field contributes to Integral Human Development as they are based on the students' physical environments, societies and cultures. They link to the National Education Plan's vision which is that secondary education enables students to achieve their individual potential to lead productive lives as members of the local, national and international community and partake of further quality education and training as they will undertake a broad range of subjects and work related activities that can be used in everyday life.

Design and Technology is one of the subject fields in the Culture and Community Learning area. This syllabus document includes the subjects Home Economics, Practical Skills, Computing and Design and Technology. These subjects will equip students with practical knowledge, skills and attitudes that will enable them to contribute meaningfully in their local communities and societies. They encourage self-reliance through enabling students to think critically and become effective problem solvers based on a model of learning that incorporates knowledge, skills and design principles in a problem- solving context. They empower students to manage their limited resources to achieve set goals and successfully make a living in their community.

By studying subjects in the Design and Technology Subject Field students will develop and understand how to use, manage, assess and understand technology and apply it in a wide range of situations such as the home, community, industry or informal work. This subject field promotes a student centred approach to learning and an understanding and appreciation that learning is a lifelong process.

I commend and approve this syllabus document as the official curriculum for the Design and Technology Subject Field to be used in all schools with Grades 9 and 10 students throughout Papua New Guinea.

DR. JOSEPH PAGELIO
Secretary for Education

Introduction

The National Curriculum Statement states that education in Papua New Guinea is outcomes based. All Lower Secondary Syllabuses use an outcomes based approach. The Design and Technology Subject Field Syllabuses have been designed using learning outcomes which identify the knowledge, skills, attitudes and values that all students achieve or demonstrate by the end of Grade 10. It selects the essential knowledge and skills from syllabuses teachers have used in the past, and incorporates this with developments in technology to ensure that the syllabus provides relevant skills and knowledge for students. The Design and Technology Subject Field is part of the national curriculum learning area Culture and Community and builds on the knowledge and skills students have learnt in primary school.

Upper Primary Making a Living - Strands	**Lower Secondary Design and Technology Subject Field – Strands**	**Lower Secondary Design and Technology Subject Field -Subjects**
Managing Resources Better Living Community Development	Planning Making Marketing Evaluating	Practical Skills Home Economics Computing Design and Technology

Assessment is an important component of teaching for learning and is integrated into the teaching and learning activities of the Design and Technology Subject Field. Continuous assessment in The Design and Technology Subject Field provides feedback to students and the teacher on students' progress towards achievement of the learning outcomes. It helps students improve their standards of achievement by knowing what they need to do well and where they need to improve. Teachers will gather evidence from students' work during the course of the term and use those continuous assessments to improve their teaching and students' learning.

The syllabuses in the Design and Technology Subject Field have been designed to be relevant by providing topics that include knowledge, skills and values that are useful for all students. The syllabuses are flexible as option units are provided to allow students to study areas of interest. All units emphasise the development of skills. School developed units can be written to suit local community needs and can be taught as part of the syllabus.

The Design and Technology Subject Field includes Home Economics, Practical Skills, Computing and Design and Technology. These syllabuses make explicit the knowledge, skills, processes, attitudes and values that students can achieve for Grade 9 and 10 in these subjects. These are expressed as broad and unit learning outcomes. They contain concepts and processes designed to build on the learning outcomes

from the Primary Syllabuses and further prepare students for advanced aspects of technology in Upper Secondary and the community.

The subjects in the Design and Technology Subject Field are in a framework which is designed to give students the opportunity to experience the design process in planning, making evaluating and at times marketing through a design project approach using a range of technologies. Using the framework makes it easy for teachers to replace any unit with their own school developed units.

This Subject Field has the potential to extend its application and relevance beyond formal schooling. In fact it will cater for the majority of the students who will not go on to further study after Grade 10.The knowledge and skills developed through studying this subject will enable students to live a meaningful and productive life by equipping them with the skills to make use of the resources in the community.

Each subject in the Design and Technology Subject Field is to be timetabled for five periods per week in Grades 9 and 10.

Rationale

Technology is about people using available resources and tools appropriately and skilfully to improve the quality of life of individuals and communities. When used innovatively it can lead to the design and development of new products or it can change existing products to meet society's changing needs and wants.

Technology was used in many societies around the world thousands of years ago. In Papua New Guinea we had the first gardeners in the world, who would have used a design process to make simple gardening and fishing tools and to develop irrigation systems. Since then our traditional technologies or ways have evolved over time. Today, technology continues to play an important role in our lives each day. It affects the way we learn, work and spend our leisure time.

The Design and Technology Subject Field will equip students with practical knowledge, skills and attitudes that will enable them to contribute meaningfully in their local communities and societies. They encourage self reliance through enabling students to think critically and become effective problem solvers based on a model of learning that incorporates knowledge, skills and design principles in problem-solving contexts. It empowers students to manage resources, to achieve set goals and successfully make a living in their community.

Students will develop and understand how to use, manage, assess and understand technology and apply it in a wide range of situations such as the home, community, industry or informal work. They will recognise their social responsibilities in regard to resources and materials being used, including taking care of waste disposal and identifying effects on the environment.

By studying technology a student is able to interact with new ideas, reflect and make decisions, use skills to a higher level, and realise designs through applied problem solving. This subject promotes a student-centred approach to learning and an understanding and appreciation that learning is a lifelong process.

The present economy in Papua New Guinea makes it difficult for most students to gain formal employment after they leave school. The Design and Technology Subject Field aims to provide life long skills and opportunities for the majority of students who will return to the communities to live a productive life as well as those who will go onto work or further study.

Curriculum principles

The national curriculum principles should influence what students learn and how teachers teach. These principles relate to Our Way of Life, Integral Human Development and Teaching and Learning (NCS, 2002, P.22).

Our way of life

Cultural relevance

Cultural relevance focuses on the richness and diversity of Papua New Guinean cultures and language. These cultures and languages are examined within their own unique contexts and within historical, contemporary and future realities. Our traditional life is based on a holistic perspective that integrates the past, present and future. Papua New Guineans are the original inhabitants of Papua New Guinea and live in sophisticated, organized and self-sufficient societies. Our customs and traditions constitute a cultural mosaic: rich and diverse, including different cultural groups. Our customs and traditions are unique. The Design and Technology Subject Field therefore enables students to

- demonstrate an understanding and appreciation of the unique Papua New Guinea communications system
- demonstrate recognition of the importance of the relationship between Papua New Guinea and the world around it.

Maintenance of vernacular language

The Department of Education's Language Policy in all Schools states that at the secondary level, lessons will be conducted in English, but teachers can use opportunities to further develop the students oral and written vernacular (or lingua franca) skills, for example when a concept is better explained using the vernacular or lingua franca. Students must be encouraged to learn and use English, but secondary schools should not discourage free communication in vernacular languages that the students speak in and out of the school grounds.

Ethics, morals and values

Papua New Guinea is striving to create a society in line with democratic, liberal traditions. The citizens of Papua New Guinea should recognize appropriate social relationship based on sound human and religious ethics, morals and values. These are required for interaction with families, villages, wantoks and other economic groups and people from other provinces and nations. The process of socialisation requires a belief in the ethics, morals and values of the Melanesian extended family, dialogue with and respect for others and a willingness to conserve and promote those aspects of our traditions, which are consistent with integral human development. Socialisation also requires an awareness of the interdependence of individuals, societies and

nations in the modern world. It requires involvement with family, church, school, community and the world beyond.

Integral human development

Facilitating integral human development

The Design and Technology Subject Field is underpinned by integral human development which is described in the National Curriculum Statement on page 21 as follows:

- *integral* in the sense that all aspects of a person are important
- *human* in the sense that social relationships are basic
- *development* in the sense that every individual has the potential to grow in knowledge, wisdom, understanding, skills and goodness.

Knowledge and skills learnt in The Design and Technology Subject Field help in the development of integral human development because it is based on an awareness of human potential and the willingness to develop this potential so that each individual can solve his or her own problems, contribute to the common good of society and maintain, promote and improve earning and living.

Papua New Guinea is a rapidly changing society and faces many challenges, including those of changing technology. To face these effectively, an individual must strive to become an integrated person and to work with others to create a better community.

Catering for diversity

Gender

All Lower Secondary Syllabuses are designed to cater for the educational needs and interests of both girls and boys. The Department of Education Gender Equity in Education Policy recommends that no student in the education system of Papua New Guinea will be disadvantaged on the basis of gender. The policy aims to prepare students for satisfying life beyond school where:

- equal, non-violent relationships exist between females and males
- rights to personal respect and safety are reflected in everyday life
- positive cultural values and individual differences are acknowledged and respected.

To implement the policy, teachers have the responsibility to use and promote gender equity practices in their classrooms and with the wider community. This means teachers:

- use teaching and learning strategies that meet the needs and rights of all female and male students
- use gender inclusive language, content, methodology and assessment

- respect positive cultural values and challenge unfair cultural practices
- respect the contributions of men and women to society
- promote positive attitudes and behaviours of social responsibility, empathy and sensitivity.

There is a need for sensitivity to local cultural practices and values, with respect to traditional roles for males and females. In the Design and Technology Subject Field, students will be given equal opportunities to participate in all practical learning and assessment activities regardless of gender.

In gender sensitive classrooms:

- there is a safe, challenging learning environment which is socially and culturally supportive
- boys and girls have the right to equal power
- students take turns in being the leader and reporter
- students share and participate in activities involving different students
- students show respect for other students and their contributions
- teachers encourage students to challenge stereo-typed gender roles.

Students with special needs

Many students have special needs. This includes students who are gifted and those who are disadvantaged. Gifted students should be given opportunities to extend their learning. Students with physical or intellectual impairments and emotional or learning difficulties need special support in the classroom. Teachers have a responsibility to ensure that the learning needs of these students are met. All students are individuals and all have the right to quality education in order to reach their full potential.

Design and Technology Subject Field subjects aim to cater for the needs of all students. Teachers may need to adapt learning experiences to cater for students with special needs. This syllabus promotes the principles of equity through providing a diverse range of learning experiences and fair assessment practices.

Teaching and learning

Design and Technology Subject Field subjects are practical and teaching and learning must reflect this. Learning will be done through projects; students will learn by problem solving and creative thinking in designing, making and evaluating their product.

Student-centred learning

The syllabuses in the Design and Technology Subject Field use a student-centred approach as a vehicle to guide and facilitate students' learning. A student-centred approach provides students with the

opportunity to practice and develop critical and creative thinking, problem solving, decision-making as well as range of practical skills and knowledge.

A student centred approach means that teaching and learning approaches need to be flexible to cater for the individual differences and learning should be relevant and meaningful to the experiences and needs of the students. A student-centred approach allows teachers to be more flexible in determining the most effective ways to help all students achieve the learning outcomes.

In the Design and Technology Subject Field students are encouraged to think critically about what they are learning and to take responsibility for their learning. They learn to teach each other and to learn from each other, to work cooperatively and to work individually. They know that learning has a meaningful and relevant purpose. They enjoy using a wide range of resources. Students learn how to communicate well with others, how to work things out for themselves and how to access the information they need. They need to learn to think in ways that make sense, using their experiences, their knowledge, their intelligence and their imagination. They also learn processes for design and skills to make and at times market a product.

Inclusive curriculum

All students are individuals and all have the right to quality education in order to reach their full potential. An inclusive curriculum uses content, language and teaching methods that take account of all students. The Design and Technology Subject Field values the experiences and knowledge of all students, regardless of gender, ability, geographic location, religious and cultural background, or socio-economic status.

Teachers must ensure that the learning and assessment activities are inclusive of all students when interpreting and implementing syllabus learning outcomes. The following statements identify important requirements of an inclusive curriculum.

- All students have fair access to resources such as time spent with teacher, space in the classroom, books and equipment, outside space.
- All students have equal opportunity to participate fully in teaching, learning and assessment activities.
- The curriculum includes and addresses the needs and interests of all students; girls as well as boys, gifted students, students with disabilities and students from different cultural and religious backgrounds.
- The experiences and knowledge of all students are valued by teachers and are reflected in classroom practice.
- Teaching and learning methods cater for different learning styles by allowing students opportunities to learn in different ways.
- Teachers use a variety of assessment methods that give students opportunities to demonstrate achievement of learning outcomes.

- Teachers have a responsibility to ensure that the curriculum they teach, and the classroom practices they use, give all students the opportunity to reach their full potential.

Relevance

The Lower Secondary Syllabuses should be relevant to the social, spiritual and resource development needs of a community. This can be achieved by integrating teaching and learning situations that reflect the knowledge, skills, attitudes and spiritual values needed for integral human development. A relevant Lower Secondary curriculum will prepare students for productive community living; integrate academic and practical education; and will provide ways to paid and unpaid employment.

Most people in Papua New Guinea work in the informal economy. Students who leave at the end of Grade 10 may need to find work in the informal economy. These students, however, will not only need to be skilled to work in the informal economy, but they will also need to be prepared to work in the formal economy and undertake formal education if there are opportunities. All students will need applied and academic skills and knowledge. All students will need to know how to adapt new technologies and knowledge appropriately to their environment.

The Design and Technology Subject Field will enable teachers to support students' learning by encouraging teaching in real-life contexts. This means relating the skills and knowledge of subjects to real life situations. People from the community could be involved in learning activities to help teach skills and traditional knowledge where appropriate.

A key focus of the Design and Technology Subject Field is to provide all students with real life and relevant learning experiences. There is a clear emphasis on the development of practical skills and knowledge that will ensure students are able to achieve and maintain a sustainable way of life beyond their school years. Learning in the Design and Technology Subject Field should provide students with opportunities to make connections with their communities and draw from their cultural, linguistic and everyday knowledge, skills and attitudes and apply this to what is being learnt in their classrooms. It is essential that students are aware of and value community and local knowledge and realise that learning takes place inside and outside the school context.

Language development across the curriculum

Language development across the curriculum should be encouraged because all subject areas provide meaningful contexts for real purpose learning. The Design and Technology Subject Field has different language requirements such as vocabulary and language features which must be explicitly taught in relevant contexts across the subject.

Lifelong learning

Design and Technology Subject Field is an important part of a student's education but learning continues throughout life. The experiences that students have in the Design and Technology Subject Field are critical in encouraging them to continue learning throughout their lives. Students know many things when they come to school. They will learn many things outside of school and continue to learn after they leave school. The curriculum should build on what students already know. Important learning in the Design and Technology Subject Field will continue throughout life. Increasingly, students who leave school will look for opportunities to continue their education and to return to school or some other educational or training institutions in order to improve their qualifications. Skills learnt in the Design and Technology Subject Field will be very important in future life.

Integration

Relevant and meaningful teaching and learning in the Design and Technology Subject Field can be provided by integrating knowledge and skills into or from a range of subjects such as Business Studies, Art, Science and Agriculture so that practical activities or projects are like real life situations.

The Design and Technology Subject Field Syllabuses will provide students with opportunities to be involved in decision making about their learning, such as the selection of projects and areas of interests. Students will have the opportunity to actively participate in a range of learning contexts, both school based and community based.

Safety

The Department of Education requires all teachers to have a duty of care. All students have a duty to act responsibly and safely at all times. Teachers and students must follow safety instructions and procedures at all times. The school must observe all safety requirements as instructed by the Secretary for Education

Design and Technology Subject Field teachers and students must be particularly safety conscious when using tools and equipment. All tools and equipment should be maintained in a safe condition. Protective clothing must be worn when necessary and appropriate safety gear such as eye and ear protection must be used at all times when needed.

Aims of Design and Technology Subject Field

In the Design and Technology Subject Field students:

- take a safe and active part in designing and making projects that are linked to their own interests, industrial practice and the community
- are responsible citizens who gain the necessary qualities and skills in order to live happily and productively in the communities in which they choose to live and serve
- apply what they are learning to life and work-related situation for the common good
- develop a culture of enterprise and wealth creation for the benefit of themselves and their societies as a whole
- adapt new technologies directly and appropriately to their environment and their own social and economic needs
- are creative, innovative and rationale thinkers in their response to problems.

Content overview

Subjects

Students may choose up to two of the following subjects to study within the Design and Technology Subject Field. If students study two subjects, each subject must be studied for five periods a week.

1. Practical Skills
2. Home Economics
3. Computing
4. Design and Technology

Broad learning outcomes

The Design and Technology Subject Field broad learning outcomes are statements that identify the knowledge, skills, attitudes and values all students should achieve or demonstrate by the end of Grade 10.

The broad learning outcomes for the Design and Technology Subject Field are:

1. use the design process to produce appropriate solutions

2. apply safe and appropriate codes and practices in the classroom and workplace

3. apply knowledge and understanding through identifying, selecting and using various materials or systems

4. demonstrate a range of practical skills and techniques

5. evaluate the appropriateness of materials or systems used to produce a product

6. communicate ideas and information in a variety of ways.

Strands

The strands describe the dimensions of the subject field. They are broad, organising structures that define ways of approaching learning in the Design and Technology Subject Field. They incorporate cross-curriculum learnings and skills and are ‘woven’ through the units within the Design and Technology Subject Field.

The strands for the Design and Technology Subject Field are planning, making, marketing and evaluating.

Planning

Planning and designing is about identifying, exploring, developing, applying, communicating and evaluating ideas.

When students plan and design they:

- identify a problem
- clarify /explain the problem
- explore and generate ideas for design solutions
- share ideas with a range people
- make appropriate design choices in terms of cost and availability of resources
- conduct a needs analysis through questioning/interviewing
- collect and collate data
- develop market research
- model or trial the design solution
- develop and refine the idea
- plan to action the design solution.

Making

Making is about producing and constructing products and processes to meet identified needs.

When students make they:

- action a design solution individually or cooperatively
- select and work with a range of tools and materials safely and resourcefully
- manage time and resources effectively
- develop an understanding of the positive and negative consequence that the production, use and disposal of a product or process could have on a community
- develop a range of skills to work with accuracy to produce a quality outcome
- adapt ideas and plans in response to constraints and difficulties.

Marketing

Marketing is about advertising, selling and profit.

When students market a product they:

- recognize and meet the needs of the user or buyer
- calculate selling prices and keep a record of sales
- calculate production costs and determine profit
- develop and use competitive marketing strategies
- explore ways to effectively advertise and sell products
- investigate ways to value add to products
- consider alternative ways that a product can be used effectively if it is not marketable.

Evaluating

Evaluating is about questioning, examining, assessing and reviewing.

When students evaluate they:

- review the outcome to check that it successfully meets the needs of the design brief
- reflect on the process of designing, planning, making and marketing to see if the parts of process could be improved for future products
- determine if the outcome works or if it could be modified and improved
- analyse the viability of the product to decide on continuation or possibility of exploring.

Grades 9 and 10 units

The content for each subject in this syllabus is organised into units within a framework. Each unit has specific learning outcomes which link with the broad learning outcomes of the subject field, topics, indications of what must be studied in each topic, assessment criteria and assessment tasks.

The subjects are made up of core and option units. Many of the option units can be developed by the school and will depend on the school's available resources, the interests of the students, and the local community. Vocational education and training units can be taught as option units.

Unit description for Practical Skills, Home Economics, Computing and Design and Technology

Each unit in each subject fits within a framework, and is designed to be taught in ten weeks. This framework is designed to give students the opportunity to experience the design process in designing, making, marketing and evaluating through a design project approach using a range of technologies such as metal, timber, construction, welding, plumbing, village technologies including traditional handicrafts, electrical technologies, textile technologies, food technologies, integrated technologies and computer technologies. Each stage of the design process is a strand that provides both content and process.

The teacher will outline the design task or project that the students will complete. When developing design tasks teachers are required to integrate essential content through the focus area of study. The unit will focus on the introduction of basic skills and processes used in construction or making of items or products. The unit will involve students in the creative manipulation of materials and safe use and maintenance of basic tools. Students will experience challenges through successfully following a design brief to achieve desirable outcomes. The needs and interests of students should be addressed when developing design tasks or projects.

Design tasks should involve designing, making and evaluating and at times marketing quality products or items that are functional and meet identified needs or opportunities. Students must undertake at least one design project each term. The project will usually take ten weeks where students:

- develop a design brief and apply action, time and budget plans in design projects
- identify suitable materials, tools and techniques for each design project
- practice and refine skills needed for the design project
- apply the design process that responds to needs and opportunities

- produce solutions, products or items reflecting quality standards appropriate to the design project.

For each design task students will develop a design folio as a document that provides ongoing evidence of the application of a design process and the specific technologies used in this process. The design folio will form part of the assessment.

Design Brief

A design brief outlines the task or project that students will be expected to complete.

A design brief consists of:

- a context
- a task
- constraints
- a design
- making
- evaluating
- marketing

The **context** explains the content and the purpose of the task or project.

The **task** provides clear instruction about the task or project.

The **constraints** specify directions or place limitations on the design solution.

The **design** encourages students to investigate, identify, explore, develop, apply and communicate their design ideas.

Making engages students in producing and constructing.

Evaluation asks students to question, examine, assess and to review.

Marketing encourages students to think about advertising, selling and making a profit.

Skills taught and learnt

When students work with a design brief they;

- analyse needs, problems and opportunities
- plan
- establish criteria for success
- research
- generate creative ideas
- communicate ideas
- experiment and test ideas
- manage resources
- use mathematical ideas and techniques

- produce design solutions
- evaluate ideas and solutions
- learn time management skills.

In each unit, workshop or classroom safety must be considered and taught

Safety

Importance of workshop safety in relation to:

- personal safety
  - back strain
  - repetitive strain injury
  - eye strain
- materials safety
- tools and equipment safety
  - electrical
  - sharp tools, blades
- care and maintenance of tools and equipment
- poisoning.

HIV/AIDS awareness in the workshop

- HIV/AIDS transmission
- treatment of blood injuries.

Skills taught and learnt:

- responsible and safe use of a range of tools, materials and techniques in the workshop, kitchen and computer laboratory.

Practical Skills

Practical Skills units

For Practical Skills, students must complete core unit 9.1, Technical drawing in Grade 9 Term 1, core unit 9.2, Working with wood in Grade 9 Term 2 and core unit 10.1, Building Construction in Grade 10 Term 1 and any four Practical Skills option units.

Grade 9 units - Core

- Technical drawing
- Working with wood

Grade 9 units - Options

Timber technology units 1, 2, 3, 4, 5
such as:

- Outdoor furniture
- Animal enclosures
- Ornaments
- Toys
- Musical instruments
- Indoor furniture
- School furniture
- Storage items.

Village technologies 1, 2, 3, 4, 5 such as:

- Basket weaving
- Cane craft
- Handicraft
- Bamboo craft
- Pandanus craft.

Grade 10 units - Core

- Building construction 1

Grade 10 units - Options

- Building construction 2
- Welding technologies
- Plumbing technologies
- Metal technologies
- Concrete technologies
- Electrical technologies
- Integrated technologies
- Timber technologies1, 2, 3, 4, 5
- School developed units
- Vocational education and training units

Unit learning outcomes mapped to broad learning outcomes

BLOs **D&T**	**1** **Use the design process to produce appropriate solutions**	**2** **Apply safe and appropriate codes and practices in the classroom and workplace**	**3** **Apply knowledge and understanding through identifying, selecting and using various materials or systems**.	**4** **Demonstrate a range of practical skills and techniques.**	**5** **Evaluate the appropriateness of materials or systems used to produce a product.**	**6** **Communicate ideas and information in a variety of ways**
Core Unit 9.1 Tech Drawing	Apply technical drawing techniques to produce a range of appropriate drawings		Demonstrate knowledge and understanding of the appropriate use of technical drawing techniques	Apply technical drawing techniques to produce a range of appropriate drawings		Apply technical drawing techniques to produce a range of appropriate drawings
All Core & Option Units.	Use the design process to produce appropriate solutions	Apply safe and appropriate codes and practices in the classroom and workplace	Apply knowledge and understanding through identifying, selecting and using various materials or systems	Demonstrate practical skills and techniques.	Use the design process to produce appropriate solutions Evaluate the appropriateness of materials or systems used to produce a product.	Use the design process to produce appropriate solutions Evaluate the appropriateness of materials or systems used to produce a product.

9.1 Technical drawing

Term 1 **10 weeks**

Technical Drawing must be completed first, before students study any other practical skills units.

Technical Drawing focuses on methods of using lettering and lines in drawings and includes the use of basic drawing instruments and appropriate drawing techniques. Students will apply the proper use of drawing instruments to design and draw an object.

Learning outcomes

Students can:

9.1.1 apply technical drawing techniques to produce a range of appropriate drawings
9.1.2 demonstrate knowledge and understanding of the appropriate use of technical drawing techniques.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Introduction to Technical drawing

- terms and definitions
- drawing instruments and their care
- lettering
- dimensioning
- lines and borders
- scales
- set square exercises
- regular polygons
- page planning
- sectioning.

Projection and graphics

- pictorial drawing (freehand)
- perspective
- third angle projection (glass box)
- orthographic projection
- isometric projection
- oblique projection
- exploded views.

Assessment

Assessment Task One

Drawing folio

Students will be expected to keep a folio of drawing exercises which range from the simple to complex. The folio will provide a record of student's learning and development. All drawing exercises and assignments should be included in the folio.

Assessment criteria

Assessment task one will be assessed on the extent to which students can:

- demonstrate knowledge and understanding of the appropriate use of technical drawing techniques
- apply technical drawing techniques to produce appropriate drawings.

50 marks

Assessment Task Two

Written response test

Students will be required to answer a number of short answer questions (maximum number 10) that test their level of understanding of the concepts introduced in the unit. For example, a question may ask students to describe the difference between drawing techniques or they may be asked to demonstrate their understanding of lettering techniques.

Assessment Criteria

Assessment task two will be assessed on the extent to which students can:

- apply understanding of drawing tools and techniques to create appropriate drawings.

50 marks

Total: 100 marks

9.2 Working with wood

Term 2 **10 weeks**

Working with Wood is designed to give students the opportunity to experience the design process in planning, making, marketing and evaluating a design task using wood. The unit will focus on the introduction of basic skills and processes used in the construction of wooden items. The unit will involve students in the creative manipulation of materials through safe use and maintenance of basic hand tools. Students will experience challenges through successfully following a design brief with emphasis on design factors and standards in achieving desirable and marketable outcomes.

Learning outcomes

Students can:

9.2.1 apply safe and appropriate codes and practices in the classroom and workplace
9.2.2 apply knowledge and understanding through identifying, selecting and using various materials or systems
9.2.3 demonstrate practical skills and techniques
9.2.4 use the design process to produce appropriate solutions
9.2.5 evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Materials

- characteristics and properties of timber and timber products in PNG (e.g. types of timber, structure, defects)
- conversion of timber to products (e.g. seasoning of timber, preservation of timber)
- fittings and hardware used with timber (e.g. hinges, handles, catches, locks).

Tools

The function of specific tools related to timber technologies such as:

- cutting tools
- boring tools
- abrading tools
- percussion tools
- punches and screw drivers.

Parts of specific tools and machines such as plane blades.

The selection and correct use of a range of contemporary tools used for:

- marking out and measuring - e.g. pencil, marking knife, marking gauge, mortise gauge, steel rule, folding rule, steel tape, try squares, fixed try and mitre square, mitre set, sliding bevel, combination square
- cutting, boring, abrading and percussion
- joining –e.g. fasteners, nails, adhesives, screws and connectors
- finishing - including abrasives such as sand paper, glass paper, garnet paper, emery cloth
- machine tools including scroll saw, drill press and disc sanding machines.

Maintenance routines for care of equipment, materials and tools

- undertake regular maintenance, e.g. check electrical cords and plugs for faults, oil blades, keep cutting sharp
- store materials, tools and equipment appropriately
- regularly clean materials, tools and equipment after use
- keep workplace environments clear and clean.

Construction techniques

- preparation – e.g. face, edge, width, thickness, length
- cutting
- joining – e.g. common joints, widening, framing
- shaping
- finishing – e.g. sanding, wood filling, polishing, waxing, painting, varnishing, spraying
- industrial production methods.

Skills taught and learnt

- identify, select and use appropriate materials for a timber project
- select and correctly use tools of timber technology for a project
- cut, shape and finish timber or timber products
- select and use appropriate techniques for the purposes of a timber project
- use appropriate surface preparations and finishes for a timber project.

Assessment

The learning outcomes will be assessed through the design folio and the completed product.

Design Task

Students must use the design process to design and make a product in wood and produce a design portfolio showing the steps undertaken in the making of the product.

The design portfolio might include:

- rough notes or sketches
- checklists
- plans
- drawings of initial design ideas
- progressive records
- work samples with comments written by the teacher
- labelled drawings and diagrams
- reports.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use tools, skills and techniques to make the product
- apply knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option units Timber technologies 1, 2, 3, 4, 5 10 weeks

Option units Timber Technologies are based on student interest. Examples are found in the teacher guide but schools can develop a unit using the framework model, and teach any aspects of timber technology that is relevant to their community and students. Schools could develop units such as:

- Outdoor furniture
- Animal enclosures
- Ornaments
- Toys
- Musical instruments
- Indoor items
- Indoor furniture
- School furniture
- Storage items.

Schools may also select from appropriate vocational education and training units.

Learning outcomes for every option unit

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate practical skills and techniques
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of content developed by the school. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Assessment

For every option Timber Technology unit students complete the following assessment requirements:

Design Task

Students must use the design process to make a product using timber, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include:

- rough notes or sketches
- checklists
- plans
- drawings of initial design ideas
- progressive records
- work samples with comments written by the teacher
- labelled drawings and diagrams
- reports.

Assessment

The learning outcomes will be assessed through the making of the product (design task), the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use tools, skills and techniques to make the product
- apply knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option units Village technologies (including traditional handicrafts)

Time 10 weeks

Option units Village Technologies are based on student interest. Examples are found in the teacher guide but schools can develop a unit using the framework model, and teach any aspects of village technology that is relevant to their community and students. Schools could develop units such as:

- Basket weaving
- Cane craft
- Handicraft
- Bamboo craft
- Pandanus craft.

These units provide students with the opportunity to use basic hand tools and equipment to manipulate plant parts and combine them with other materials to produce useful and/or marketable articles or artefacts. Students will work through the design process to produce a product made from materials found in the local community.

Learning outcomes

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate practical skills and techniques
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content.
Safety must be taught in context and proper equipment and protective clothing used where necessary.

Materials

Characteristics and properties of a wide range of materials such as:

- bamboo
- pandanus
- coconut, cane
- vines
- tree bark
- wood
- palms

- pitpit
- pigs tusk
- sea shells
- hard plant seeds
- animal teeth
- feathers.

The use of materials in traditional and non-traditional ways.

Tools

- selection of specific tools related to materials appropriate to a design project such as small knife, bush knife, broken glass, gauge, stripper
- the function and safe use of a range of contemporary tools used for measuring, marking out, cutting, making and construction.

Techniques

- traditional and non-traditional techniques used for:
  - cutting or harvesting
  - selection of materials
  - storing materials
  - shaping a variety of materials
  - joining different materials
  - finishing.

Skills taught and learnt

- experiment with combinations of a wide range of materials considering their characteristics and properties
- identify how materials have been used in innovative and non-traditional ways
- select and use a wide range of materials for the identified needs and opportunities of a design project
- explore ways that tools can be safely used to achieve new results
- select and safely use tools and equipment for a design project.

Assessment

For every option unit of Village Technology students complete the following assessment requirements:

Design Task

Students must use the design process to make a product or products from a village technology.

Assessment

The learning outcomes will be assessed through the design task.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use tools, skills and techniques to make the product
- apply knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief

Total: 100 marks

Students are encouraged to develop products that reflect their own needs or those of the local community.

10.1 Building construction

Term 1 **Time 10 weeks**

Building construction is a prerequisite for the following units. It must be completed first if students study any of the following option units:

- Welding technologies
- Plumbing technologies
- Cementing technologies
- Metal technologies.

Building construction is designed to give students the opportunity to experience planning, making, and evaluating a building or a model of a building. This unit will focus on methods of construction and includes the use of common materials, basic hand tools, machines and construction techniques. Students will experience design/problem-solving concepts through the development of a design project. They will apply the safe use and maintenance of appropriate tools, equipment and machines related to the design and construction of a simple building.

If students wish to study this unit in more depth, it can be continued as an option, Building construction 2.

Learning outcomes

Students can:

10.1.1 apply safe and appropriate codes and practices in the classroom and workplace
10.1.2 apply knowledge and understanding through identifying, selecting and using various materials or systems
10.1.3 demonstrate a range of practical skills and techniques
10.1.4 use the design process to produce appropriate solutions
10.1.5 evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Building conventions and regulations

- read, understand and follow architectural drawings and building regulations
- draw simple sketches and plans related to building construction
- identify legal requirements and procedures for:
  - plans and specifications
  - building permits
  - reading plans.

Materials

Characteristics of building materials such as:

- timbers
- cement
- reinforcement
- roofing iron
- bars
- boards.

Tools

The function of specific tools related to timber technologies such as:

- cutting tools
- boring tools
- abrading tools
- percussion tools
- punches and screw drivers.

The selection and correct use of a range of contemporary tools used for:

- marking out and measuring - e.g. pencil, marking knife, marking gauge, mortise gauge, steel rule, folding rule, steel tape, try squares, fixed try and mitre square, mitre set, sliding bevel, combination square
- cutting, boring, abrading and percussion
- joining –e.g. fasteners, nails, adhesives, screws and connectors
- finishing - including abrasives such as sand paper, glass paper, garnet paper, emery cloth
- machine tools including scroll saw, drill press and disc sanding machines.

Parts of tools and machines.

Parts of specific tools, such as plane blades.

Maintenance routines for care of equipment, materials and tools

- undertake regular maintenance, e.g. check electrical cords and plugs for faults, oil blades, keep cutting sharp
- store materials, tools and equipment appropriately
- regularly clean materials, tools and equipment after use
- keep workplace environments clear and clean.

Construction

Identify and explain construction and apply processes involved in the building industry such as:

- profiles

- foundations
- frame
- stairs
- roofing.

Recognise and explain construction techniques such as:

- concrete mixtures
- reinforcement
- compression
- tension.

Describe materials and methods of construction for:

- walls (internal and external cladding)
- roof and trusses
- doors
- windows
- ceilings
- stairs.

Knowledge of appropriate techniques such as:

- drawing plans
- costing
- safe use of tools and equipment
- site preparation e.g. cleaning, levelling, filling
- floor construction e.g. levelling, fixing bearers, joists and floor boards
- construction of wall and roof frames – selection of materials, calculations, measuring, cutting
- external and internal wall cladding - – selection of materials, calculations, measuring, cutting
- stair construction e.g. types and components
- joinery and installation
- window and door construction e.g. types and components
- cementing e.g. mixing, finishing techniques, cutting
- plumbing e.g. fastening, cutting, clamping and pinning
- preparation of timber e.g. face, edge, width
- finishing e.g. sanding, wood filing, polishing, waxing, painting, varnishing, spraying.

Skills taught and learnt

- identify, select and use appropriate materials for building construction project
- select and correctly use building construction tools for a design project
- prepare, cut, shape and finish timber and other materials for construction purposes
- select and use appropriate techniques for building construction project.

Assessment

Design Task

Students must use the design process to plan and carry out a small building construction project such as a model of a building and produce a design folio showing all the steps undertaken in the making of the product.

The design portfolio might include:

- rough notes or sketches
- checklists
- plans
- drawings of initial design ideas
- progressive records
- work samples with comments written by the teacher
- labelled drawings and diagrams
- reports.

Assessment

The learning outcomes will be assessed through the building construction project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option units

Building construction 2

Welding technologies

Plumbing technologies

Cement technologies

Metal technologies

Grade 10 **Time 10 weeks**

Building construction 2 is an option unit that can be studied by students who wish to extend the work they have done in Building Construction 1, by studying the content in more depth or by focussing on different aspects of building construction.

Welding technologies focuses on principles of operation and methods of arc welding. Practical involves creative manipulation of materials with safe use and maintenance of the basic hand tools, equipment welding machines, and safety in the welding shops. It will give students the opportunity to experience the design process in planning, making, marketing and evaluating.
Access to a welder, electrodes and safety shield and gloves is required.

Plumbing technologies is an option unit that follows Building Construction. It is developed to give students the opportunity to experience problem solving in plumbing. The unit will focus on fastening techniques with the safe use of plumbing materials, tools, equipment and machines.

Cementing technologies is developed to give students the opportunity to experience planning, making, and evaluating a cementing work. This unit will focus on methods of repair and maintenance dealing with the use of common materials, basic hand tools, equipment and machines in concreting. Practical involves the safe use and maintenance of hand tools, equipment and machines in construction of simple concrete work.

Metal technologies is designed to give students the opportunity to experience the design process in planning, making, marketing and evaluating a design task using metal. The unit focuses on methods in bench metalwork and sheet metalwork involving creative manipulation of materials through safe use and maintenance of the basic hand tools and equipment, metalworking machines and finishes.
Access to appropriate hand tools to safely cut, bend and join metal is required.

The units Welding technologies, Plumbing technologies, Cementing technologies and Metal technologies have the same learning outcomes, assessment tasks and assessment criteria.

Learning outcomes for every option unit

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate a range of practical skills and techniques
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Welding technologies

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Materials and tools

Functions of welding equipment and machines such as:

- AC welder
- DC welder
- metals sheets
- safety equipments
- electrodes (core wire, flux coating).

Techniques

Techniques such as:

- correctly striking the arc
- operating the welding machine
- selecting the correct electrode
- welding correctly according to the given task.

Skills taught and learnt

- select and use metals in welding using a design project
- select and correctly use appropriate hand and machine tools for welding project
- demonstrate different welding skills according to a given project.

Design Task

Students must use the design process to construct a product using welding, using appropriate knowledge, skills and techniques.

Plumbing Technologies

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Materials

Tubes and guttering materials such as:

- black mild steel pipes
- galvanised mild steel pipes
- galvanised guttering
- down pipes
- PVC pipes.

Tools

Specific trade tools related to plumbing:

- hand tools – e.g. hammers, chisels, tinsnips, hacksaw, stilsons, multigrips, tape measure, rules, and scribers
- pneumatic and electrical power tools – e.g. hand drills, grinders, jackhammers, chisels, jigsaws, angle grinders, shears, and nibblers.

Techniques

Techniques such as:

- fastening techniques using common fasteners
- cutting accurately
- joining a range of different materials
- clamping and pinning.

Skills taught and learnt

- select and use appropriate hand tools in a project that uses plumbing techniques
- investigate and use accessories where appropriate for a plumbing project
- systematic planning for model development.

Design Task

Students must use the design process to construct a product which uses appropriate plumbing knowledge, skills and techniques.

Cementing technologies

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Materials

Knowledge of the characteristics and the types of aggregates needed such as:

- crushed hard stones
- river gravel and sand stone
- broken bricks
- blast furnace slag and furnace ashes (coal residue)
- cement mixtures.

Tools

- planning site, preparation, forming, and reinforcing tools – e.g. bush-knives, spades and shovels, wheelbarrow, string-line, nails, claw hammers, sledge hammers, line and spirit levels, clear hose for water level, crosscut saw, square
- levelling, mixing and finishing tools – eg trowel, float (metal/wood) , edging tool, broom and brush, bucket, spades and shovels, straight edge (timber for screening), cement mixer, mixing platform
- power tools (portable) – e.g. circular saw, electric drill, and electric jointer plane.

Techniques

Techniques such as:

- mixing accurately
- finishing including brushed finished, wood-float finish, exposed aggregated finish, steel trowel finish
- cutting accurately.

Skills taught and learnt

- select and use appropriate hand tools in cementing in the design project
- investigate and use accessories where appropriate for a design project
- systematically planning for model development.

Design Task

Students must use the design process to construct a product which uses appropriate cementing knowledge, skills and techniques.

Metal technologies

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Materials

- characteristics and properties of metals including alloys and sheet metals e.g. galvabond, zinc anneal, zinc alum, marvi plate
- a range of appropriate fittings and hardware.

Tools

The function, selection and correct use of a range of contemporary tools used for:

- layout, e.g. scriber, divider, trammel, centre punch
- cutting, e.g. straight tin snips, curved tin snips, universal snips, aviation snips, hacksaw
- measuring and marking out - e.g. steel rule, engineers tri squares, combination square, combination set, vernier caliper
- stakes and uses, e.g. funnel stakes, creasing iron, half-moon stake, round bottom stakes
- bending and joining
- finishing, drilling and folding, e.g. pan break, rollers, guillotine.

Techniques

Construction techniques including cutting, shaping, joining and finishing metals e.g. edge treatment:

- wired edge
- rolled
- folded
- surface coating.

Skills taught and learnt

- select and use metals in the development of a design project
- investigate a range of items where appropriate for a design project
- select and correctly use appropriate hand and machine tools for a design project
- cut, shape and finish metals
- select and use appropriate techniques for the purpose of a design project.

Design Task

Students must use the design process to make a product, or small products in metal, using appropriate knowledge, skills and techniques.

Assessment for Building construction 2, Welding technologies, Plumbing technologies, Cementing technologies, Metal technologies

Assessment

The learning outcomes will be assessed through the project and a written test.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks each unit

Option Electrical Technologies

Grade 10 — 10 weeks

This option unit is designed to give students the opportunity to do an introductory unit on electrical technologies. It provides students with the opportunity to use basic electrical components to make simple electrical circuits.

Learning outcomes

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate a range of practical skills and techniques
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Safety

Observe and practice safety procedures such as:

- general safety
- electrical safety
- personal safety
- tools and equipment safety
- safety in power tools
- prevention and treatment of electrical shock
- fire safety.

Identify and understand the different forms of electricity:

- chemical – batteries
- mechanical – dynamo
- light
- solar cells
- heat
- pressure.

Materials/components

- types and functions of common electronic components such as diodes, resistors, capacitors, switches and batteries.

Tools

Understand the function, selection and correct use of a range of contemporary tools such as:

- multi-meter
- soldering iron
- altimeter
- de-solder
- wire strippers
- drill press.

Techniques

Techniques such as:

- soldering
- drilling
- cutting.
- methods of production of simple circuits and circuit boards.

Skills taught and learnt

- identify and categorise common electronic components
- select and use electronic components for a design project
- select and correctly use tools of electronics technology for a design project
- solder efficiently
- set out and construct simple circuits for a design project.

Assessment for Electrical technologies

Design Task

Students must use the design process to make a product using electronic components.

Assessment

The learning outcomes will be assessed through the design project, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Home Economics

Home Economics units

To study Home Economics students must complete the three core units and four options.

Introduction to food technology may be taught in Grade 9 or Grade 10.

All units are designed to be taught in 10 weeks.

Core units

- Fibres and fabrics

Grade 9 Options

- Basic Sewing

Textile Technologies 1, 2, 3, 4, 5
such as:

- Making a meri blouse
- Designing clothes
- Under garments
- Sports gear
- Bed linen
- Adapting second hand clothes
- Sewing a garment with collar, sleeves and buttons
- Tailoring – pattern drafting
- Home crafts
- Costumes

Grade 10 Core

- Introduction to food technology (can be taught in Grade 9 or Grade 10)
- Food and nutrition

Grade 10 Options

Food technologies 1, 2, 3, 4, 5
such as:

- Seafood cookery
- Traditional cookery
- Cooking with local produce
- Catering for parties or functions
- Catering for school students
- School developed units.

Vocational education and training units such as catering

Unit learning outcomes mapped to broad learning outcomes

BLOs **D&T**	**1** **Use the design process to produce appropriate solutions**	**2** **Apply safe and appropriate codes and practices in the classroom and workplace**	**3** **Apply knowledge and understanding through identifying, selecting and using various materials or systems**.	**4** **Demonstrate a range of practical skills and techniques**	**5** **Evaluate the appropriateness of materials or systems used to produce a product. 22**	**6** **Communicate ideas and information in a variety of ways**
All Core and Option Units.	Use the design process to produce appropriate solutions	Apply safe and appropriate codes and practices in the classroom and workplace	Apply knowledge and understanding through identifying, selecting and using various materials or systems 10.1 Demonstrate knowledge of effect of good and poor nutrition on the body	Demonstrate practical skills and techniques.	Use the design process to produce appropriate solutions Evaluate the appropriateness of materials or systems used to produce a product.	Use the design process to produce appropriate solutions Evaluate the appropriateness of materials or systems used to produce a product.

9.1 Fibres and fabrics

Term 1 **10 weeks**

Fibres and Fabrics provides students with the opportunity to learn about different types of fabrics and to master skills in producing textile items. It will focus on safe use of all sewing equipment, practice of hand and machine sewing skills and completing different types of decoration and fastenings. Students will demonstrate problem solving skills through a design brief which will enable meaningful learning.

Learning outcomes

Students can:

9.1.1 apply safe and appropriate codes and practices in the classroom and workplace
9.1.2 apply knowledge and understanding through identifying, selecting and using various materials or systems
9.1.3 demonstrate practical skills and techniques
9.1.4 use the design process to produce appropriate solutions
9.1.5 evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Materials

Characteristics and properties of different fabric types and fibres including:

- woven fabrics
- knits
- non-wovens
- naturals
- synthetics
- fibre blends
- animal
- plants.

Common weaves such as:

- plain weaves
- pile weaves
- twill weave.

Tools

The function and correct use of a range of contemporary tools used for:

- measuring and cutting
- joining, constructing, and assembling
- embroidery
- weaving
- crochet
- colouring
- knitting.

Techniques

- construction of traditional and contemporary textile items
- care and maintenance of textile products
  - laundry processes
  - care labels on every garment
- embellishing traditional and contemporary textile items
  - colouring and decorating
  - decorative dyeing techniques
  - embroidery stitches
  - appliqué
  - screen printing
  - block printing
  - batik
  - tapa making
  - crochet
  - knitting.

Skills taught and learnt

- investigate fibre properties and fabric characteristics appropriate to the design project
- select and use appropriate textile materials for a design project
- select and correctly use appropriate tools and equipment for a textile project
- select and use techniques appropriate for the purposes of a textiles project.

Assessment

Design Task

Students must use the design process to make textile products, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include:

- notes
- checklists
- progressive records
- work samples with comments written by the teacher
- samples.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use tools, skills and techniques to make the product
- apply knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option unit Basic sewing 10 weeks

Basic sewing is an option unit which provides students with the opportunity to plan, draft and produce fabric items and to master basic sewing skills .This unit will focus on the safe use of all sewing equipment, practice of hand and machine sewing skills and doing different types of embroidery and using fasteners. Students will demonstrate problem solving skills through the design brief which will enable meaningful leaning.

Learning outcomes

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate practical skills and techniques to produce basic hand stitches, embroidery work and attach fasteners
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Tools

- safe use and care of basic sewing equipment such as needles, scissors
- safe use and care of sewing machines available in PNG.

Techniques

- use sewing tools and equipment such as sewing machines, needle and thread, embroidery needles and cottons, to produce samples of:
  - basic hand stitches (tacking stitch, running stitch, back stitch, hemming stitch)
  - embroidery/ decorative stitches (chain stitch, stem stitch, satin stitch, blanket stitch)
  - basic seams (open seams, flat seams, french seams)
- attach different types of fasteners
  - hook and eye
  - press studs
  - buttons and button holes
  - zippers
  - tape ties.

Skills taught and learnt

- investigate properties and characteristics of a range of basic sewing techniques appropriate to the design project
- select and correctly use appropriate tools and equipment for a sewing project
- select and use techniques appropriate for the purposes of a sewing project.

Assessment

Design Task

Students must use the design process to make a product using basic sewing techniques.

The design portfolio might include, for example:

- notes
- checklists
- patterns and drafts
- progressive records
- work samples with comments written by the teacher
- samples.

Assessment

The learning outcomes will be assessed through the design project, and a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use tools, skills and techniques to make the product
- apply knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option units Textile technologies 1, 2, 3, 4, 5

Grade 9 or 10 **10 weeks**

Textile Technology option units are based on student interest. Schools can teach any aspects of textile technology that is relevant to their community and students. Schools could develop units such as:

- Making a meri blouse
- Designing modern clothes
- Making underclothes
- Sports clothes
- Bed linen
- Adapting Second hand clothes
- Sewing a garment with collar, sleeves and buttons
- Tailoring – pattern drafting
- Home crafts
- Costumes for school performances.

Learning outcomes for every option unit

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate practical skills and techniques
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of content developed by the school.

Assessment

For every option unit, students complete the following assessment requirements:

Design Task

Students must use the design process to make textile products, and produce a design portfolio of patterns and designs of garments showing all the steps undertaken in the making of the product.

The design portfolio might include, for example:

- notes
- checklists
- patterns and drafts
- progressive records
- work samples with comments written by the teacher
- samples.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use tools, skills and techniques to make the product
- apply knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

10.1 Introduction to food technologies

Term 1 **10 weeks**

Students must study Introduction to food technologies and Food and nutrition. These units must be completed before students can study any other food technology option units.

Introduction to food technologies is a core unit, which will enable students to identify the equipment used in the kitchen and to be able use them appropriately and competently. The students learn care and safety involved in using kitchen equipment or tools and will develop the knowledge of safe and hygienic food preparation.

Learning outcomes

Students can:

10.1.1 apply safe and appropriate codes and practices in the classroom and workplace
10.1.2 apply knowledge and understanding through identifying, selecting and using various materials or systems
10.1.3 demonstrate a range of practical skills and techniques
10.1.4 use the design process to produce appropriate solutions
10.1.5 evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Safety

- safety and safety rules in the kitchen
- safety when handling sharp tools/equipment
- safe handling of electrical appliances
- types of home accidents, care and first aid treatment
- safety when lighting gas stoves/kerosene stoves/wood stoves.

Materials

Characteristics and properties of foods appropriate to a design project:

- different food sources
  - the foods that can be eaten raw (e.g. fruits and various vegetables used in salads)
  - meat
  - seafood
  - milk and milk products
  - eggs
  - fruits

- vegetables, cereal and cereal products
  - flour and foods produced from flour
- safe gathering, handling and storage of food in hot climate.

Tools, utensils and appliances

Use, cleaning and care of stoves:

- wood stoves
- kerosene stoves
- gas stoves
- electric stoves.

Parts of a stove

The functions and correct and safe use of a variety of contemporary food utensils and appliances used for:

- cutting
- measuring
- preparation
- processing and cooking.

Recipes including the format and abbreviations commonly used.

Maintenance routines for care of equipment and materials

- undertake regular maintenance, e.g. check electrical cords and plugs for faults, keep cutting edges sharp
- store materials and equipment appropriately
- regularly clean materials and equipment after use
- keep kitchens clear and clean.

Techniques

- hygiene
  - personal
  - kitchen
  - food
- reasons for cooking food, ways of cooking food and the positive and negative effects types of cooking has on food
  - boiling
  - steaming
  - mumu
  - dry heat – baking and roasting
  - frying – shallow and deep
  - smoking
- specific techniques used in
  - food preparation
  - food processing
  - cooking food
- presenting food for visual appeal.

Skills taught and learnt

- identify common properties of food within each of the food groups
- select and prepare food for a design project
- select and correctly use a variety of appropriate food utensils and appliances to prepare quality food items for a design project
- select, interpret and/or modify/develop recipes for a design project.

Assessment

Design Task

Students must use the design process to make food products, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include:

- rough notes or sketches
- checklists
- plans
- recipes
- budgets
- work samples with comments written by the teacher
- labelled drawings and diagrams
- reports.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

10.2 Food and nutrition

Term 2 **10 weeks**

Food and Nutrition teaches students to design healthy food menus and produce food products using appropriate materials, tools and equipment safely and competently. Students will apply the principles of nutrition, food preparation and presentation and explore the relationship between health and food selection. Students are able to show skills in decision-making and problem solving by applying knowledge of food nutrients and their application in situations that individuals and families face in everyday life. This could include maximising the nutrition value of foods for individuals with special dietary requirements or making recommendations for improvement in the nutrition value of menus.

Learning outcomes

Students can:

10.2.1 apply safe and appropriate codes and practices in the classroom and workplace
10.2.2 demonstrate knowledge of effect of good and poor nutrition on the body
10.2.3 demonstrate practical skills and techniques
10.2.4 use the design process to produce appropriate solutions
10.2.5 evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content.

Essential nutrients

Essential nutrients for good health - carbohydrates, protein, oils (lipids), vitamins and minerals:

- the functions of nutrients in the human body
- list the main food sources
- recommended daily intake and how to use the information
- identify and explain nutrition-related diseases
- understand and explain digestion, absorption and metabolism.

Special nutritional requirements

Nutritional requirements for specific age groups such as:

- children
- pregnant and lactating women
- the elderly
- sports people

- active/passive workers
- invalids.

Processing food

Function and nutritional consequences of food changing processes such as:

- freezing
- drying
- preserving, e.g. smoking salting
- processing, e.g. fermenting and cooking.

Safety and hygiene

Safe food preparation and hygiene standards and techniques:

- personal hygiene
- kitchen hygiene
- food hygiene
- thawing, cooking times and temperatures.

Regulations in the food industry

Skills taught and learnt

- select appropriate and nutritious food for a range of circumstances
- select appropriate equipment and apply suitable techniques when preparing food
- use safe and hygienic practices when handling and preparing food.

Assessment

Design Task

Students must use the design process to make nutritious food products, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include:

- rough notes or sketches
- checklists
- plans
- recipes
- budgets
- work samples with comments written by the teacher
- labelled drawings and diagrams
- reports.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option Food technologies 1, 2, 3, 4

Grade 10 **10 Weeks**

Food technology option units teach students to produce food products using appropriate materials, tools and equipment safely and competently. Students will apply the principles of food preparation and presentation and explore the relationship between health and food selection. Students will demonstrate safe food practices and investigate the effect technology has on production and preservation of food. Students will complete food practical tasks often working in cooperative groups.

Food technologies options can be completed in either Grade 9 or Grade 10.

Food technology option units are based on student interest. Schools can teach any aspects of food technology that is relevant to their community and students. School can develop units such as:

- Seafood cookery
- International cooking
- Traditional cookery
- Cooking with local produce
- Catering for parties or functions
- School canteens
- Food preservation.

Learning outcomes for every Food technologies option unit

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate knowledge of effect of good and poor nutrition on the body
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of content developed by the school. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Assessment

For every option unit students complete the following assessment requirements.

Design Task

Students must use the design process to make nutritious food products, and produce a portfolio of recipes showing all the instructions needed for the making of the product. The portfolio might include:

- notes
- checklists
- recipes
- progressive records
- budgets
- sample menus
- work samples with comments written by the teacher.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Option Integrated technologies

Grade 9 and 10 **10 weeks**

In this unit students will use a number of different technologies to produce a product.

Learning outcomes

Students can:

- apply safe and appropriate codes and practices in the classroom and workplace
- apply knowledge and understanding through identifying, selecting and using various materials or systems
- demonstrate a range of practical skills and techniques
- use the design process to produce appropriate solutions
- evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and proper equipment and protective clothing used where necessary.

Materials

Characteristics and properties of a wide range of materials such as:

- metals
- polymers
- textiles
- timber
- village materials and resources
- the use of materials in traditional and non-traditional ways.

Tools

Specific tools related to materials appropriate to a design project.

The function and safe use of a range of contemporary tools used for:

- measuring
- marking out
- cutting
- construction.

Techniques

Traditional and non-traditional techniques used for:

- cutting
- shaping a variety of materials
- joining different materials
- finishing.

Skills taught and learnt

- experiment with combinations of a wide range of materials considering their characteristics and properties
- identify how materials have been used in innovative and non-traditional ways
- select and use a wide range of materials for the identified needs and opportunities of a design project
- explore ways that tools can be safely used to achieve new results
- select and safely use tools and equipment for a design project
- experiment with traditional and non-traditional techniques
- select and use traditional and non-traditional techniques for the identified needs and opportunities of a design project.

Assessment

Design Task

Students must use the design process to make products from a variety of technologies, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include, for example:

- rough notes or sketches
- drawings or plans
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- provide evidence of investigation when designing/planning including, identifying a problem or need, completion of a needs analysis, drawings of initial design ideas
- document processes used to make the product and provide time line for completion
- choose an appropriate product to make and provide reasons for final choice
- safely and competently use a range of tools, skills and techniques to make the product
- demonstrate knowledge and understanding of tools, processes and systems to make the product
- produce a product which meets the design brief
- document evidence of market research i.e. costing, advertising and value adding where appropriate
- document and evaluate the applied process and outcome and make suggestions for future improvements if applicable.

Total: 100 marks

Computing

Computing units

In Grade 9 Computing students must complete the three core units before selecting an option unit. All Grade 10 units are options. Keyboarding is integrated into all Grade 9 core units.

Grade 9

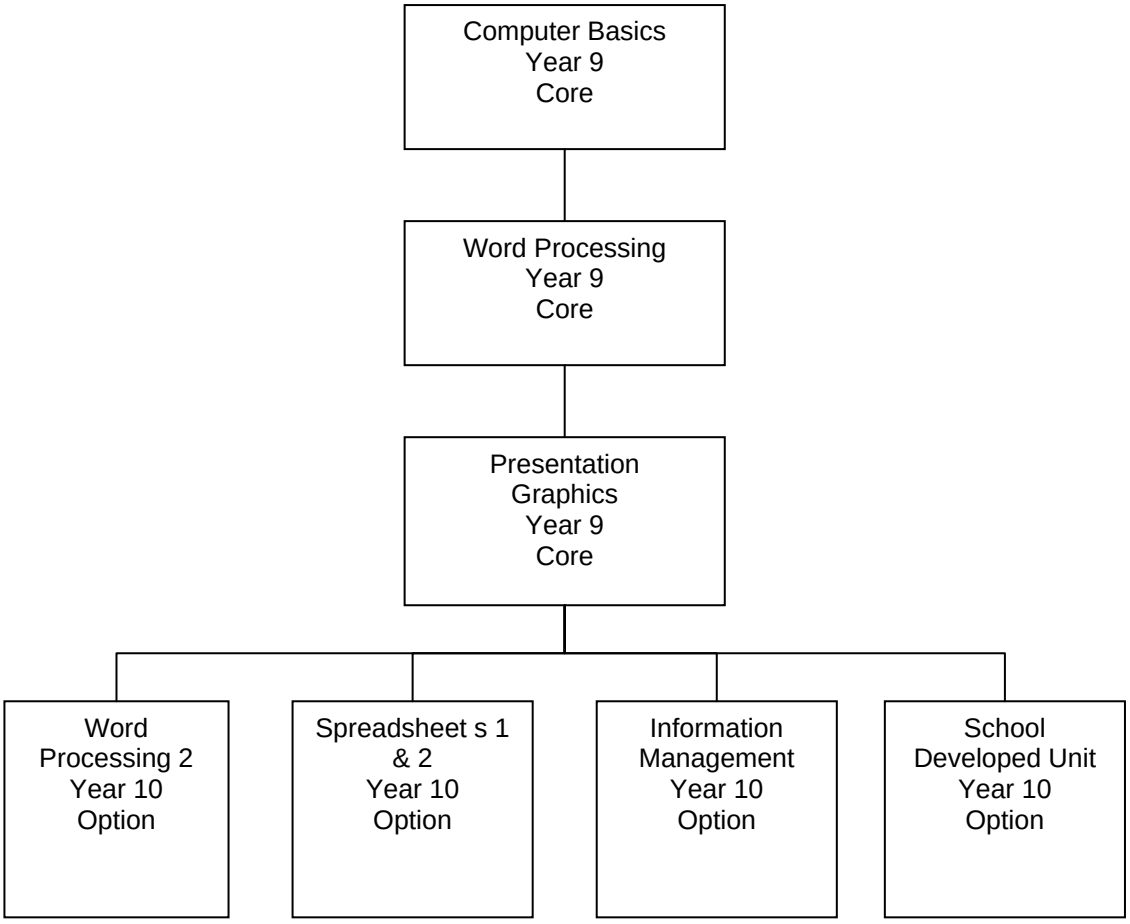
Core

Computer basics1, 2
Word processing
Presentation graphics

Grade 10

Options

Databases
Information management
Spreadsheets 1
Word processing 2
Spreadsheets 2
The internet
School developed units


Computer Basics
Year 9
Core
Word Processing
Year 9
Core
Presentation
Graphics
Year 9
Core
Word
Processing 2
Year 10
Option
Spreadsheet s 1
& 2
Year 10
Option
Information
Management
Year 10
Option
School
Developed Unit
Year 10
Option

Unit learning outcomes mapped to broad learning outcomes

BLOs **D&T**	**1** **Use the design process to produce appropriate solutions**	**2** **Apply safe and appropriate codes and practices in the classroom and workplace**	**3** **Apply knowledge and understanding through identifying, selecting and using various materials or systems**.	**4** **Demonstrate a range of practical skills and techniques.**	**5** **Evaluate the appropriateness of materials or systems used to produce a product. 22**	**6** **Communicate ideas and information in a variety of ways**
Core Unit – 9.1 Computer Basics	Use the design process to produce an appropriate solutions	Describe ethical practices used when dealing with data and information	Identify and demonstrate appropriate use of a range of hardware components and peripheral devices	Describe a range of computer applications	Evaluate the appropriateness of materials or systems used to produce a product.	Communicate ideas and information in a variety of ways
Core unit – 9.2 Word Processing	Designs, produce and evaluate appropriate solutions to a range of problems	Use ethical practices when dealing with information and software technology	Use word processing application for specific tasks	Use word processing application for specific tasks	Designs, produce and evaluate appropriate solutions to a range of problems	Use word processing application for specific tasks
Core unit – 9.3 Presentation Graphics	Design and produce appropriate solutions to a range of problems	Use ethical practices when dealing with information and software technology	Recognise and use a presentation graphics application that is suitable for specific tasks Identify and use problem-solving processes when creating a presentation	Recognise and use a presentation graphics application that is suitable for specific tasks		Recognise and use a presentation graphics application that is suitable for specific tasks
Option Unit – Spreadsheet 1& 2	Design, produce and evaluate appropriate solutions to a range of problems	Use ethical practices when dealing with information and software technology	Recognise and use software programs that are suitable for specific tasks Identify and use problem-solving processes when creating spread sheet solutions	Recognise and use software programs that are suitable for specific tasks Identify and use problem-solving processes when creating spread sheet solutions	Design, produce and evaluate appropriate solutions to a range of problems. Justify decisions made when creating information and software technology solutions.	Design, produce and evaluate appropriate solutions to a range of problems.

BLOs **D&T**	**1** **Use the design process to produce appropriate solutions**	**2** **Apply safe and appropriate codes and practices in the classroom and workplace**	**3** **Apply knowledge and understanding through identifying, selecting and using various materials or systems**.	**4** **Demonstrate a range of practical skills and techniques.**	**5** **Evaluate the appropriateness of materials or systems used to produce a product. 22**	**6** **Communicate ideas and information in a variety of ways**
Option Unit – Information Management	Determine appropriate solutions to a range of problems	Describe ethical practices used when dealing with the internet	Identify and use problem-solving processes when accessing and retrieving information using computers Describe a range of past, current and emerging information and software technologies	Identify and use problem-solving processes when accessing and retrieving information using computers	Justify decisions made when accessing information	Describe a range of past, current and emerging information and software technologies
Option Unit – Word Processing 2	Design, produce and evaluate appropriate solutions to a range of problems	Use ethical practices when dealing with information and software technology	Recognise and use software programs that are suitable for specific tasks Identify and use problem-solving processes when creating solutions	Identify and use problem-solving processes when creating solutions	Justify decisions made when creating information and software technology solutions Design, produce and evaluate appropriate solutions to a range of problems	Recognise and use software programs that are suitable for specific tasks
Option Unit – The Internet	Design, produce and evaluate appropriate solutions to a range of problems	Describe ethical practices when dealing with information and software technology	Describe a range of past, current and emerging information and software technologies	Identify and use problem-solving processes when creating solutions	Design, produce and evaluate appropriate solutions to a range of problems Justify decisions made when creating information and software technology solutions	Describe ethical practices when dealing with information and software technology Describe a range of past, current and emerging information and software technologies

Computing

1. Entry unit **Computer basics 1** assumes that students have no previous computing experience. This unit is to be completed before any other computer unit (except **Keyboarding**) is taken. Students with previous computing experience may complete this unit in a very short time and progress to other computing units.
2. **Word processing 1** has **Computer basics 1** as a pre-requisite.
3. **Presentation graphics 1** and any option unit have both **Word processing 1** and **Computer basics 1** as pre-requisites.
4. Links to other subject areas can be made using the unit **Word processing 1** and **Presentation graphics 1**. Students could bring material from other subject areas and prepare reports and presentations.
5. **Keyboarding** could be undertaken without completing any other unit. It would consist of formal training in keyboarding. Teacher skills to instruct students may be a problem here but software is available to run this module as a Computer Aided Instruction type course. Students could use computers outside the classroom (eg Library computers). Keyboarding would be a good link to further vocational studies for students leaving school in year 10.
6. When students complete the 3 units they would have a good grounding for further computing in grades 11 and 12 or vocational education.
7. The option unit system allows classes to proceed at their own rate. If students complete the core units in less than the assigned time option units could be undertaken.
8. **Computer basics 1, Word processing 1**and **Presentation graphics 1** could be completed in Year 9 (assuming 5 periods a week is allocated) or with less teaching time per week 2 years could be taken.
9. Schools that have the resources could complete the 3 basic units and then choose units from the option list

9.1 Computer basics 1, 2

Term 1 and /or Term 2 **10 weeks**

This unit, Computer Basics, introduces students to a computer. It assumes that students have no previous computing experience. This unit is to be completed before any other computer unit (except Keyboarding) is taken.

Access to a computer word processing, spreadsheet and presentation graphics applications is required.

Learning outcomes

Students can:

9.1.1 identify and demonstrate appropriate use of a range of hardware components and peripheral devices
9.1.2 describe ethical practices used when dealing with data and information
9.1.3 describe a range of computer applications
9.1.4 use the design process to produce appropriate solutions
9.1.5 evaluate the appropriateness of materials or systems used to produce a product.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary.

What is a computer and what is it made up of?

- identify basic computer hardware components and peripheral devices:
  - keyboard and mouse
  - printer
  - hard drive
  - disk
  - headphones/speakers
  - monitor
  - CD-Rom
  - floppy drive
  - file server

- use and understand basic computer related terms:
  - login (log-in)
  - icon
  - hour glass/busy
  - internet
  - maximize
  - directory
  - edit
  - software
  - software piracy
  - cursor
  - scroll bar
  - word processor
  - minimize
  - network
  - open file and folder
  - hardware
  - copyright
  - license agreement

- care and appropriate use of hardware
  - keyboard and mouse

  - computer disks
  - CD-Rom
  - turn computer off/on independently
  - special keyboard keys (shift key, arrow keys, spacebar, backspace, enter key)

Computer applications - introduction

- create and save a new document
  - use save
- open, view, and print documents
  - print entire file
  - use print preview
- format documents
  - selecting font style and size.

Presentation skills

- prepare an electronic presentation
  - identify intended use
  - create and edit slides/screens
  - add and edit text (font, size, colour)
  - add a suitable background
- change the look of your presentation
  - arrange objects on the slide/screen
  - insert graphics and/or clip art
  - save
- save a presentation as a new and/or existing presentation and close the file.

Spreadsheet skills

- create and save spreadsheets
  - identify intended use
  - determine columns and rows
  - create simple calculation formulas
  - enter and edit data
- open, view, and print spreadsheets
  - print entire file
  - use print preview
- save
  - save a spreadsheet as a new and/or existing spreadsheet and close the file.

File management

- use basic computer management skills
  - demonstrate ability to access and exit software
  - demonstrate ability to manage files (saving, retrieving)
  - demonstrate ability to organize files (renaming, deleting, copying, moving, folder creation and deletion)
  - demonstrate ability to use disk utilities (formatting, copying, deleting, creating backup, saving).

Computer networking and telecommunication skills (option)

- use the network:
  - demonstrate appropriate use of log-in numbers/names
  - demonstrate appropriate use of network printing
  - save files to individual home directories
  - access on-line information for research
  - access information from a directory
  - send and receive electronic mail
  - set up user passwords.

Assessment

Design Task

Students must use the design process to complete a task or project using a computer. They must develop a portfolio showing all the steps undertaken during the task or project.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- identify and demonstrate appropriate use of a range of hardware
- describe ethical practices used when dealing with data and information
- describe a range of applications and their purpose
- develop a product using a computer.

Total: 100 marks

9.2 Word processing

Term 2 and/or 3 **10 weeks**

In this unit students will learn the function and capabilities of what is probably the most widely used computer application, i.e., a word processor. Students will develop skills that they can use in various situations. Students will apply their skills to produce simple documents.

Access to a computer with word processing application required.

Learning outcomes

Students can:

9.2.1 use word processing application for specific tasks
9.2.2 design, produce and evaluate appropriate solutions to a range of problems
9.2.3 use ethical practices when dealing with information and software technology.

Content

Students acquire knowledge and skills through the teaching and learning of this content.
Safety must be taught in context and ergonomic furniture provided and used where necessary.

Fundamental computer skills (review and extend on Computer Basics 1)

- care and appropriate use of hardware
  - identify the functions and advantages of computer productivity software
  - word processing.

File management (review and extend on Computer Basics 1)

- use basic computer management skills
  - access and exit software
  - manage files (saving, retrieving)
  - organise files (renaming, deleting, copying, moving, folder creation and deletion)
  - use disk utilities (formatting, copying, deleting, creating backup, saving).

Word processing

- create and save a new document
  - identify intended use
  - use save and save as

- open, view, and print documents
  - print entire file
  - use print preview
  - print selected parts
- format documents
  - select font style and size
  - word spacing
  - indent
  - justify text
  - line spacing
  - change case
  - select page orientation
  - margins
  - setting tabs
  - using headers, footers and pagination
- edit text
  - changing font style and size
  - cutting, copying, pasting, and deleting text
  - using spell check
  - using thesaurus
  - using find and replace feature
- use desktop publishing techniques
  - inserting graphics
  - sizing graphics
  - columns
  - tables
- use a word processor in real world context to, for example:
  - write stories or poems
  - type reports
  - generate letters
  - create a resume
  - create a formal report for another subject/unit.

Assessment

Design Task

Students must use the design process to make a product using a variety of word processing techniques and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using a word processor
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of word processing skill
- apply a broad range of appropriate techniques with competence in the development of a word processed document
- produce solutions that respond to the design project
- apply appropriate evaluation techniques throughout the design project.

Total: 100 marks

9.3 Presentation graphics

Term 4 **10 weeks**

In this unit students will learn skills of presenting material in effective ways through the use of applications such as Power Point. Students will apply their skills to create simple presentations.

Access to a computer with presentation graphics application required.

Learning outcomes

Students can:

9.3.1 recognise and use a presentation graphics application that is suitable for specific tasks
9.3.2 identify and use problem-solving processes when creating a presentation
9.3.3 design and produce appropriate solutions to a range of problems
9.3.4 use ethical practices when dealing with information and software technology.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary.

The presentation graphics application

Develop an understanding of the main advantages / features of a presentation graphics application:

- prepare an electronic presentation
  - create and edit slides/screens
  - add and edit text (font, size, colour)
  - design a presentation using 2 or more different forms of media
- change the look of your presentation
  - customize the background
  - arrange objects on the slide/screen
  - insert graphics, clip art, and/or digital pictures
  - use word art to enhance titles or to create original art
- customise
  - add slide transitions to your slide show
  - use sounds to enhance your presentation
  - place video in your presentation (optional)
  - create slide layouts for tables and/or charts
  - arrange slides/screens in a logical and appropriate order
  - animate text and/or graphics to add impact
- save
  - save a presentation as a new and/or existing presentation and close the file

  - save as presentation to a new location (shared directory for presentation – (optional)
  - save as a web page (optional)
- present
  - open an existing multi-media project
  - practice presentation skills for audience (use of microphone, posture, delivery skills)
  - deliver presentation
  - create notes to have for final presentation.

Assessment

Design Task

Students must use the design process to make a product using a presentation graphics application, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using a presentation graphics application
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of presentation graphics skills
- apply a broad range of appropriate techniques with competence in the development of graphics presentation
- produce solutions that respond to the design project
- apply appropriate evaluation techniques throughout the design project.

Total: 100 marks

Grade 10 units

Option Spreadsheets 10 weeks

In this unit students will learn the function and capabilities of a spreadsheet application. Students will develop skills that they can utilise in varied situations. Students will apply their skills to create simple spreadsheet solutions. The emphasis in this unit is to familiarise the student with the application's core features rather than the application of the use of a spreadsheet.

Access to a computer with word processing and spreadsheet applications required.

Learning outcomes

Students can:

- recognise and use software programs that are suitable for specific tasks
- identify and use problem-solving processes when creating spread sheet solutions
- design, produce and evaluate appropriate solutions to a range of problems
- use ethical practices when dealing with information and software technology.

Content

Students acquire knowledge and skills through the teaching and learning of this content.
Safety must be taught in context and ergonomic furniture provided and used where necessary.

The spreadsheet

Develop an understanding of the main advantages / features of a spreadsheet application:

- create and save spreadsheets
  - identify intended use
  - specify data organization
  - determine columns and rows
  - set cell attributes
  - create simple calculation formulas
  - enter and edit data
- retrieve data
  - sort data
  - create chart(s)
- print spreadsheets.

- edit data
  - insert column or row

  - delete column or row
  - use fill down/across
  - save updated spreadsheet
- generate graphs from spreadsheets
  - determine and create appropriate type of graph
  - incorporate graphs in word processing.

Assessment

Design Task

Students must use the design process to construct a spreadsheet, and produce a design portfolio showing all the steps undertaken in the construction of the spreadsheet.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using spreadsheets
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of techniques from spreadsheets
- apply a broad range of appropriate tools and techniques with competence in the development of a spreadsheet design project
- produce solutions that respond to the design project
- apply appropriate evaluation techniques throughout the design project.

Total: 100 marks

Option Databases 10 weeks

In this unit students will learn of data handling systems. Students will learn the basic structure of a database and learn to query a database created by the teacher. The emphasis of the unit is on developing skills at interrogating databases

Learning outcomes

Students can:

- recognise and use software programs that are suitable for specific tasks
- identify and use problem-solving processes when creating solutions
- design, produce and evaluate appropriate solutions to a range of problems
- justify decisions made when creating information and software technology solutions
- use ethical practices when dealing with information and software technology.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary.

Data handling

Develop an understanding of data bases:

- create and save databases
  - identify intended use
  - specify data organization
  - name fields
  - set field attributes
  - enter data in a consistent form
  - edit data as needed
- retrieve data
  - sort
  - search for specific data by field
  - create and print reports
- edit data
  - add records to a file
  - add fields to a record
  - delete records from a database file
  - delete a field from a record
  - save updated records
  - determine appearance of page
  - insert headers and footers
  - print report.

Assessment

Design Task

Students must use the design process to develop a database by handling data, and produce a design portfolio showing all the steps undertaken in the making of the product.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge and skills in handling data)
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of data
- apply a range of appropriate and techniques with competence in the development of data bases
- produce quality solutions that respond to identified needs and opportunities in each design project
- apply appropriate evaluation techniques throughout each design project.

Total: 100 marks

Option Information management 10 weeks

In this unit students will learn about accessing and retrieving information using computers. They will learn to use CR ROMS such as electronic encyclopaedias, databases and spreadsheets to find and manage information. The emphasis of the unit is to develop skills so that the student is able to search for usable and appropriate information.

Access to a computer with database, word processing and spreadsheet applications required. Searchable database also needed. Use of electronic encyclopaedias is optional but recommended.

Learning outcomes

Students can:

- identify and use problem-solving processes when accessing and retrieving information using computers
- determine appropriate solutions to a range of problems
- justify decisions made when accessing information
- describe ethical practices used when dealing with the internet
- describe a range of past, current and emerging information and software technologies.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary.

Accessing and retrieving information

Knowledge of accessing and retrieving information:

- access/retrieve information:
  - identify a need for information
  - identify appropriate resources
  - use of library catalogue
  - use of internet (or intranet)
  - define search parameters.
- use a database
- produce research project incorporating information retrieved from at least two different types of source
- use of student created databases.

Information organisation

- identify useful information from search
- take notes/paraphrase from search
- cite electronic sources for bibliography.

Information analysis

- compare information from at least two sources
- identify trends in data
- evaluate for accuracy, relevance, appropriateness, comprehensiveness, and bias
- prepare reports on analysis using a computer application (word processor, spreadsheet or presentation graphic tools).

Assessment

Design Task

Students must use the design process to access information for a purpose using a variety of information retrieval methods, and produce a portfolio showing all the steps undertaken in the process.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in researching and retrieving information ethically using the a variety of sources
- apply a broad range of appropriate skills with competence
- produce quality solutions that respond to identified needs
- apply appropriate evaluation techniques throughout each design project.

Total: 100 marks

Option Word processing 2 10 weeks

In this unit students will extend and further develop their word processing skills and use these skills to design a solution to a problem presented through a case study or design brief. The emphasis of the unit is the design and production of a suitable word processed document.

Access to a computer and word processing applications is required.

Learning outcomes

Students can:

- recognise and use software programs that are suitable for specific tasks
- identify and use problem-solving processes when creating solutions
- design, produce and evaluate appropriate solutions to a range of problems
- justify decisions made when creating information and software technology solutions
- use ethical practices when dealing with information and software technology.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary.

Formatting and printing

- format headers and footers, including automatic codes for page numbering and file paths
- page set-up dialogue box to adjust margins, paper size and orientation
- print dialogue box to print multiple copies or specific page ranges of a document. use of the print dialogue box to print to a different printer use of the print dialogue box to set printer specific options
- apply advanced formats to text and paragraphs using the format menu. formats should include: line spacing, indents, font effects and underlining
- use built in templates
- create templates.

Tables

- insert and format a table, including:
  - adding
  - sizing rows and columns
  - applying changes to borders and shading
  - using AutoSum and sort options.

Lists

- bulleted lists
- numbered lists
- format lists (bulleted or numbered, including outline numbering).

Diagrams and pictures

- draw simple figures using the drawing tools provided within your word processor
- use the equation editor (or equivalent) add in to produce correct mathematical notation within their document
- use clipart and word art
- create clipart and word art
- insert and format a picture from a file (paint bmp, photo jpg etc.).

Assessment

Design Task

Students must use the design process to develop a product using a range of word processing skills and techniques, and produce a design portfolio showing all the steps undertaken in the developing of the product.

The design portfolio might include:

- checklists
- initial design ideas
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in researching, experimenting, generating and communicating creative design ideas and solutions using word processing
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of tools and techniques
- apply a broad range of appropriate tools and techniques with competence in the development of a word processed product
- produce quality solutions that respond to identified needs and opportunities in each design project

- apply appropriate evaluation techniques throughout each design project.

Total: 100 marks

Option Spreadsheets 2 10 weeks

In this unit students will extend and further develop their spreadsheet skills and use these skills to design a solution to a problem presented through a design brief. The emphasis of the unit is the design and production of a suitable spreadsheet solution.

Access to a computer and spreadsheet applications is required.

Learning outcomes

Students can:

- recognise and use software programs that are suitable for specific tasks
- identify and use problem-solving processes when creating solutions
- design, produce and evaluate appropriate solutions to a range of problems
- justify decisions made when creating information and software technology solutions
- use ethical practices when dealing with information and software technology.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary**.**

Formatting and printing

- apply more advanced formats to cell contents
  - number
  - currency
  - date
  - time
  - fractions
  - percentages
  - text
- insert and delete rows, columns and cells in the worksheet
- format headers and footers, including automatic codes for page numbering and file paths
- page set-up dialogue box to adjust margins, paper size and orientation, gridlines on / off, print order
- the print dialogue box: to print multiple copies or specific sheets or whole workbook
- printing to a different printer
- use the print dialogue box to set printer specific options.

Formula

- simple formulas. =. – x. /
- formulas using ranges of cells
- sort data alphabetically, ascending, descending, on multiple columns.

Graphical representation of data

- create a chart (using wizards where applicable) from a series of data
- apply different styles of chart:
  - bar
  - column,
  - line
  - pie, etc.
- 3D charts
- chart components and controls
- formatting data series:
  - axis titles
  - colours
  - backgrounds
  - styles
  - legend
  - labels.

Assessment

Design Task

Students must use the design process to develop a product using a range of spreadsheet skills and techniques, and produce a design portfolio showing all the steps undertaken in the developing of the product.

The design portfolio might include, for example:

- rough notes or sketches
- checklists
- progressive records
- work samples with comments written by the teacher
- drafts.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in researching, experimenting, generating and communicating creative design ideas and solutions using spreadsheets
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of tools and techniques
- apply a broad range of appropriate tools and techniques with competence in the development of design projects
- produce quality solutions that respond to identified needs and opportunities in each design project
- apply appropriate evaluation techniques throughout each design project.

Total: 100 marks

Option The internet 10 weeks

In this unit students will learn about the development of the Internet and the World Wide Web (WWW). Students will learn how to connect to an Internet Service Provider (ISP) and use both e-mail and the Internet. Students will learn how to search the WWW for information and will be made aware of concerns and issues arising from the use of the Internet. The emphasis of the unit is to develop skills such that the student is able to send / receive e-mail and to independently search the internet for usable and appropriate information.

Access to a computer, modem and internet connections is required.

Learning outcomes

Students can:

- identify and use problem-solving processes when creating solutions
- design, produce and evaluate appropriate solutions to a range of problems
- justify decisions made when creating information and software technology solutions
- describe ethical practices used when dealing with data and information
- describe a range of past, current and emerging information and software technologies.

Content

Students acquire knowledge and skills through the teaching and learning of this content. Safety must be taught in context and ergonomic furniture provided and used where necessary.

Knowledge of the internet and the communication processes

- hardware and software required to connect one computer to another over long distances
- the purpose of a modem (change digital signals into analogue signals and vice versa, prepare data for distribution of a transmission network) and a web browser (display data in a consistent manner using a common mark-up language, describe predominantly textual information)
- how, why, when the internet was started with a simple description of what / how the internet works
- differences between the internet and the world wide web. the amount of information the internet potentially represents / contains
- issues relating to content control, censorship and copyright
- issues relating to the open nature of the internet include, inappropriate content such as racist, cult, ‘alternative’, holocaust denial sites, pornography, plagiarism and cheating, amongst others.

Tools/Applications

- applications designed to assist the user in accessing the Internet Protection (anti-spyware tools, anti-phishing tools, content filtering applications, privacy / personal information protection tools, cookie / history washers, etc.)
- the role / function and purpose of an ISP.

Skills and techniques

- set up an account and connect via modem or other connection method to an ISP
- use the main features of a web browser, including bookmarks and ‘favourites’
- navigate through a web site using hyperlinks
- navigate to a web site directly using the site’s URL
- search the web for specific content using various web-search engines.

Assessment

Design Task

Students must use the design process to develop a product using the internet, and produce a design portfolio showing all the steps undertaken in the developing of the product.

The design portfolio might include, for example:

- notes
- checklists
- www web site addresses
- work samples with comments written by the teacher
- drafts
- web pages.

Assessment

The learning outcomes will be assessed through the design project, the design portfolio, a written test and discussion and reflection.

Assessment criteria

The learning outcomes will be assessed by the extent to which the student can:

- demonstrate knowledge of and skills in researching, experimenting, generating and communicating creative design ideas and solutions using the internet
- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of tools and techniques
- apply a broad range of appropriate tools and techniques with competence in the development of design projects
- produce quality solutions that respond to identified needs and opportunities in each design project
- apply appropriate evaluation techniques throughout each design project.

Total: 100 marks

Design and Technology

Design and Technology units

The subject Design and Technology consists of seven units from the Practical Skills, Home Economics and Computing subjects. Each unit must be taught in ten weeks.

Design and Technology enables students to choose a variety of units from the Design and Technology Subject Field Syllabuses: to pick and choose the units that are of interest to them.

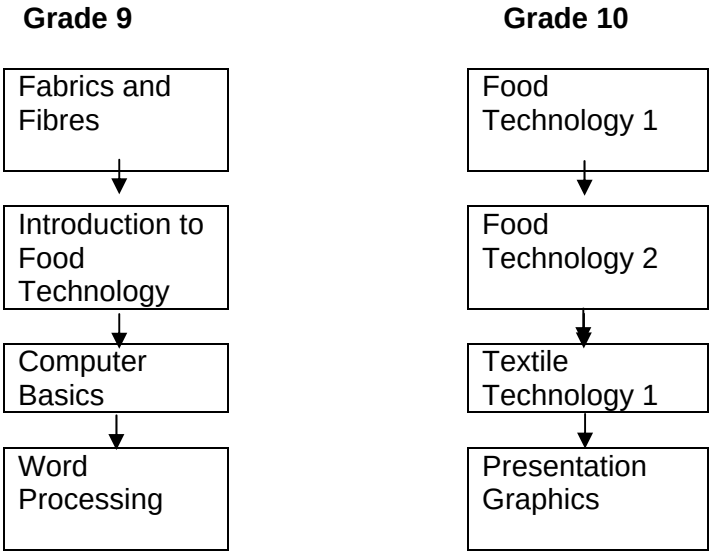
Students may study any of the Practical Skills or Home Economics units that are of interest, provided the school has the resources to teach the unit. At least seven units must be studied, four in Grade 9 and three in Grade 10.

If students decide to study some of the Computing units, they must do the core units before they study the options.

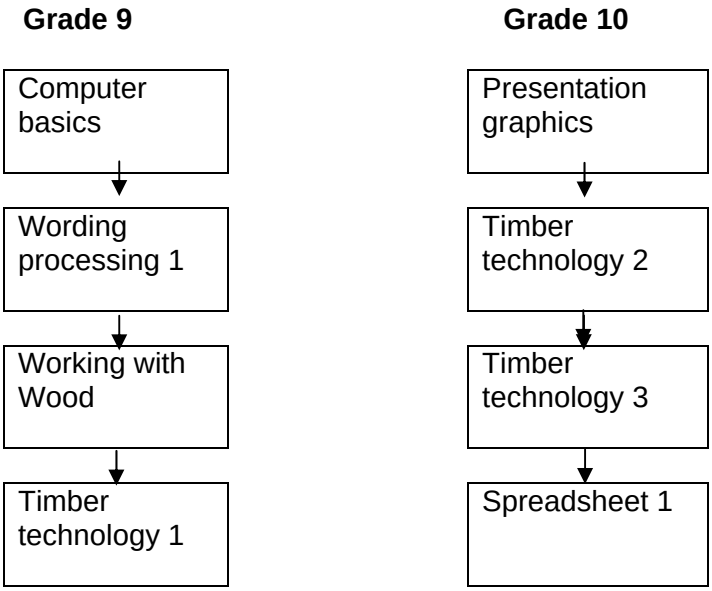
The learning outcomes and assessment tasks and criteria are described in each unit. All units are based on the design process and students must make a product in every unit.

Design and Technology - Examples of possible unit selections

Example 1



Example 2



Assessment, examinations and certification

Assessment and reporting practices described here are detailed further in the National Assessment and Reporting Policy for Papua New Guinea (2003) and in other support materials produced by the Department of Education.

Assessment

The main purpose of assessment is to improve student learning.

Assessment needs to be *for* learning as well as *of* learning. It is used to evaluate and improve teaching and learning, report achievement and provide feedback to students on their progress.

Assessment measures students' achievement of learning outcomes as described in the syllabus. It is the ongoing process of identifying, gathering and interpreting information about students' achievement of the learning outcomes.

For teaching and learning to be outcomes-based, teachers need to plan their teaching and assess learner performance in relation to outcomes using criteria derived from those outcomes.

Assessing in an outcomes-based way involves focusing less on whether a learner has "passed" or "failed" and more on what outcomes a learner has achieved and in which areas further support is required.

Assessment in the Design and Technology Subject Field

A student's achievement in the subjects of the Design and Technology Subject Field at the end of Grade 10 will be assessed against the broad learning outcomes. Assessment of student progress towards achieving these broad outcomes is cumulative throughout Grade 9 and 10 using specific outcomes for each unit. The matrixes at the beginning of each subject show how the unit outcomes are linked to the broad learning outcomes.

During the course of each unit students must complete the tasks specified for the unit. Teachers will expand each task and provide clear guidelines to students for how the task will be completed and how the criteria will be applied.

The assessment tasks and criteria in each unit ensure that there is a common focus for internal assessment in the subject across schools while allowing for flexibility in the design of tasks. A variety of tasks are specified to give students the opportunity to demonstrate all the broad learning outcomes in different ways and to improve the validity and reliability of the assessment.

It is important that teachers plan the teaching and learning sequence so that there is a balanced spread of assessment during the unit. Some tasks, such as investigations or case studies can be designed so that

they are completed over a period of time rather than at the end of the unit. Other tasks can be done immediately the relevant section of the unit has been covered.

Assessment for the School Certificate

A student's overall achievement in Practical Skills, Home Economics, Computing and Design and Technology subjects will be both internally and externally assessed. The mark awarded to each student for the School Certificate will be a combination of the internal assessment mark provided by the school and the examination mark.

Internal Assessment

Internal assessment provides a measure of a student's achievement based on a wider range of syllabus content and outcomes than may be covered by the external examination alone.

For Practical Skills, Home Economics, Computing and Design and Technology the internal assessment marks provide a summation of each student's achievements in Grades 9 and 10. The assessment tasks used to determine the internal assessment mark must comply with the types of tasks and assessment criteria specified in each of the units.

All schools must meet the requirements for internal assessment as specified in the Grade 10 Assessment, Examination and Certification Handbook.

External Examination

The external examination provides a measure of student achievement of those aspects of the broad learning outcomes that can be reliably measured in an examination setting. Questions for the external examination in Practical Skills, Home Economics, Computing and Design and Technology subjects will be developed using the outcomes, knowledge and skills in the core units.

Recording

All schools must meet the requirements for maintaining and submitting student records as specified in the *Grade 10 Assessment, Examination and Certification Handbook*.

Certification

Candidates will be awarded a School Certificate only if they meet all requirements for internal and external assessment. Eligibility rules for the award of the School certificate are specified in Grade 10 Assessment, Examination and Certification Handbook.