

Design and Technology Subject Field Lower Secondary Syllabuses

Design and Technology

Practical Skills

Home Economics

Computing



Papua New Guinea
Department of Education

Issued free to schools by the Department of Education

Published in 2006 by the Department of Education, Papua New Guinea

© Copyright 2006, Department of Education, Papua New Guinea

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted by any form or by any means electronic, mechanical, photocopying, recording or otherwise without the prior written permission of the publisher.

ISBN 9980-935-20-0

Acknowledgements

The Lower Secondary Design and Technology Subject Field Syllabuses were written, edited and formatted by the Curriculum Development Division of the Department of Education. The development of the syllabuses was coordinated by Sam Erepan.

Teachers, inspectors, tertiary educators, community members, representatives from non-government organisations and the Design and Technology subject field Subject Advisory Committee have developed these syllabuses through meetings, workshops and consultations.

This document was developed with the support of the Australian Government through the Curriculum Reform Implementation Project.

Contents

Secretary's message.....	iv
Introduction	1
Rationale	3
Curriculum principles.....	4
Aims of Design and Technology subject field.....	10
Content overview	11
Grades 9 and 10 units.....	15
Design and Technology units.....	17
Practical Skills units.....	22
Home Economics units.....	47
Computing units	68
Assessment, examinations and certification	96

Secretary's message

This syllabus document 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. This syllabus document includes the subjects Design and Technology, Home Economics, Practical Skills and Computing. 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 subjects contribute 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 by undertaking 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. The subjects 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 Design and Technology subjects students 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. These subjects promote 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 approach. The Design and Technology subject field syllabuses, Design and Technology, Home Economics, Practical Skills and Computing 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. They select the essential knowledge and skills from syllabuses teachers have used in the past, and incorporate this with developments in technology to ensure that the syllabuses provide 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 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 Design and Technology subjects are in a framework which gives 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. It caters for students who will not go on to further study after Grade 10. The knowledge and skills developed through studying these subjects will enable students to live meaningful and productive lives by equipping them with skills to use 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 has been used in societies around the world for thousands of years. Some of the first gardeners in the world were Papua New Guineans who would have used a design process to make simple gardening and fishing tools and develop irrigation systems. Since then our traditional technologies or ways have evolved. Today, technology plays an important role in our lives each day. It affects the way we learn, work and spend our leisure time.

Design and Technology subjects equip students with practical knowledge, skills and attitudes that 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. They empower students to manage resources, to achieve set goals and successfully make a living in their community.

Students develop an understanding of 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 recognise their social responsibilities in regard to resources and materials being used.

By studying Design and Technology subjects students interact with new ideas, reflect and make decisions, use skills to a higher level, and realise designs through applied problem solving. The subjects promote 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 subjects aim to provide life long skills and opportunities for students who return to the communities to live a productive life as well as for those who will go onto work or further study.

Curriculum principles

The lower secondary Design and Technology syllabuses are based on the following curriculum principles taken from the *National Curriculum Statement* for Papua New Guinea. These curriculum principles should influence what teachers teach and how students learn Design and Technology subjects.

Our way of life

Cultural relevance

Cultural relevance focuses on the richness and diversity of Papua New Guinean cultures and language. 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, and include different cultural groups. Our customs and traditions are unique. The Design and Technology subjects therefore enable 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 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 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

Design and Technology subjects contribute to integral human development which is described in the *National Curriculum Statement* 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 Design and Technology subjects help in the development of integral human development because they are based on an awareness of human potential and 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 opportunities.

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 Design and Technology syllabuses are designed to cater for the educational needs and interests of both girls and boys. The Department of Education's *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 lives 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.

There is a need for sensitivity to local cultural practices and values, with respect to traditional roles for males and females. 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.

In Design and Technology subjects 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 subjects aim to cater for the needs of all students. Teachers may need to adapt learning experiences and assessment tasks to cater for students with special needs.

Teaching and learning

Design and Technology subjects are practical and teaching and learning must reflect this. Learning will be done through projects, problem solving and creative thinking in designing, making and evaluating products.

Student-centred learning

The Design and Technology syllabuses 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 and decision-making skills as well as range of practical skills and knowledge.

A student centred approach means that teaching and learning strategies need to be flexible to cater for 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 Design and Technology subjects 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 syllabuses value the experiences and knowledge of all students, regardless of gender, ability, geographic location, religious and cultural background, or socio-economic status.

When interpreting and implementing syllabus learning outcomes teachers must ensure that the learning and assessment activities are inclusive of all students. 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. A key focus of Design and Technology subjects 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 Design and Technology provides 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.

People from the community could be involved in learning activities to help teach skills and traditional knowledge where appropriate.

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 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. This knowledge and skills are developed in Design and Technology subjects.

Language development across the curriculum

All subject areas provide meaningful contexts for real purpose learning. The Design and Technology subjects have different language requirements such as vocabulary and language features which must be explicitly taught in relevant contexts.

Lifelong learning

Design and Technology is an important part of a student's education but learning continues throughout life. The experiences that students have in Design and Technology subjects 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. 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 Design and Technology subjects will be very important in future life.

Integration

Relevant and meaningful teaching and learning in Design and Technology subjects can be provided by integrating knowledge and skills 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 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 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 subjects students:

- take a safe and active part in designing and making projects that are linked to their own interests and the community
- develop a culture of enterprise 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.
- 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 situations for the common good

Content overview

Subjects

Students may choose up to two 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.

The subjects are:

- Design and Technology
- Practical Skills
- Home Economics
- Computing.
- If students study two subjects from the Design and Technology subject field teachers must ensure that students do not study the same unit twice. For example a student studying the subjects Design and Technology and Practical Skills must do the core unit – Working with Wood – in Practical Skills. This means that Working with Wood cannot be selected again as an option unit in the subject 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
3. apply knowledge and understanding of processes 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 Design and Technology subjects. They incorporate cross-curriculum learning and skills and are 'woven' through the units within Design and Technology subjects.

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 or 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 need analysis through questioning/interviewing
- collect and collate data
- model or trial the design solution
- develop and refine the idea
- plan to develop the design solution into a product.

Making

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

When students make they:

- develop a design solution into a product
- 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.

Marketing

Marketing is about advertising, selling and profit.

When students market a product they:

- recognise and meet the needs of the user or buyer
- calculate production costs and determine profit
- 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 product 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 product works or if it could be modified and improved.

Design process

As an integral part of the design process, the teacher provides a design brief for the project that the students will complete for assessment. When developing a design brief, teachers are required to integrate the essential content of the unit being studied. The needs and interests of students should be addressed when developing design briefs.

- Assessment tasks involve designing, making and evaluating and at times marketing quality products or items that are functional and meet identified needs or opportunities.

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

Design Brief

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

Context	The context explains the content and the purpose of the task or project.
Task	The task provides clear instruction about the task or project.
Constraints	The constraints specify directions or place limitations on the design solution.
Design	The design encourages students to investigate, identify, explore, develop, apply and communicate their design ideas.
Making	Making engages students in producing and constructing.
Evaluation	Evaluation asks students to question, examine, assess and to review.
Marketing	Marketing encourages students to think about advertising, selling and making a profit.

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.

Grades 9 and 10 units

The content for the Design and Technology, Practical Skills, Home Economics and Computing syllabuses is organised into units which are based on a common framework. The framework provides the unit learning outcomes, assessment task and assessment criteria. Content is provided in the syllabuses for core units and some option units. 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. Schools will need to determine the content for school developed option units and insert this into the framework.

Each core and option 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. Each unit in each syllabus is designed to be taught in ten weeks.

Each unit focuses on the introduction of basic skills and processes used in construction or making of items or products. Units involve students in the creative manipulation of materials and the safe use and maintenance of basic tools.

Design and Technology

Design and Technology units

The subject Design and Technology consists of a core unit and six other units from the Practical Skills, Home Economics or 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.

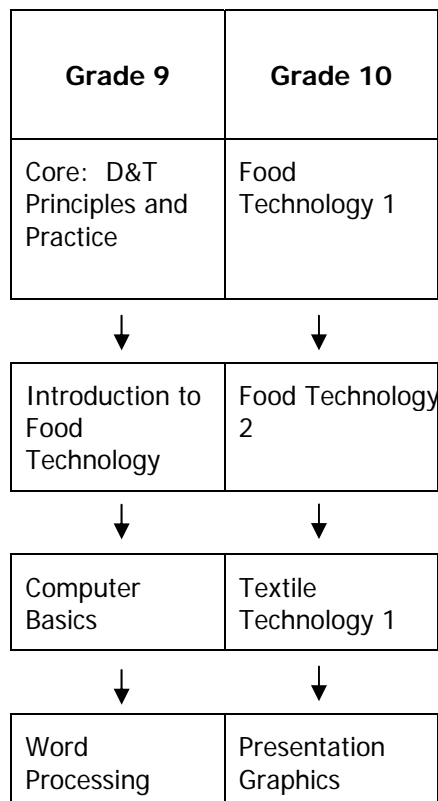
If students decide to study some of the Computing units, they must do the core units before they study the options.

- A student studying Design and Technology and another subject from the field, such as Practical Skills, cannot study the same unit twice. For example, the core unit – Working with Wood – must be studied in Practical Sills. This means that Working with Wood cannot be selected again as an option unit in the subject Design and Technology.

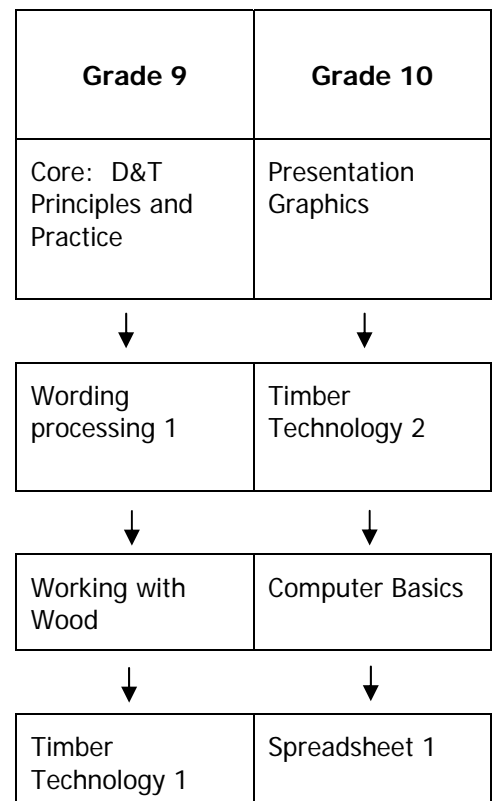
The learning outcomes and assessment tasks and criteria are described in each unit. All units are based on the design process and students must make a product in every unit.

Examples of possible unit selections

Example 1



Example 2



Unit learning outcomes mapped to broad learning outcomes						
BLOs	1	2	3	4	5	6
D&T	Use the design process to produce appropriate solutions	Apply safe and appropriate codes and practices in the classroom	Apply knowledge and understanding of processes through identifying, selecting and using various materials or systems.	Demonstrate a range of practical skills and techniques.	Evaluate the appropriateness of materials or systems used to produce a product.	Communicate ideas and information in a variety of ways
Core Unit: Design and Technology Principles and Practices	9.1.3 Describe and use the design process to produce appropriate solutions		9.1.2 Describe and apply elements of design	9.1.3 Describe and use the design process to produce appropriate solutions	9.1.3 Describe and use the design process to produce appropriate solutions	9.1.1 Investigate and explain the nature and impact of technological change 9.1.3 Describe and use the design process to produce appropriate solutions
All core and option units selected will have a variation of the following outcomes						
	Use the design process to produce appropriate solutions	Apply safe and appropriate codes and practices in the classroom	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 Design and Technology Principles and Practice

10 weeks

Technological change is a major aspect of the history, culture and development of societies and nations. Over the past two centuries societies in Papua New Guinea have been exposed to and begun using increasingly sophisticated technologies. In this unit students examine how and why various technologies have developed, how different technologies work, elements of design and the design process, and the impact of technological change.

Learning outcomes

Students can:

- 9.1.1 investigate and explain the nature and impact of technological change
- 9.1.2 describe and apply elements of design
- 9.1.3 describe and use the design process to produce appropriate solutions.

Content

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

Traditional and modern technologies

- comparison of materials used in production of traditional and modern items such as boats, clothing, bilas, crafts
- comparison of construction techniques and tools – traditional and modern – used for example in home building, light sources, crafts and clothing production
- communication and information technologies, for example development of telephone, television, computers.

Elements of design

- basic drawing skills
- size, shape, colour and texture
- function
- utility
- aesthetics

Design and technological change

- impact of design and technological change on everyday life
- appropriate technology – adaptation, sustainability

The design brief

- steps in the design process
- applying the design process to make a product.

Assessment

Assessment task one

Develop diagrams, charts, models or an annotated collection of at least two items highlighting changes in design and technology and the impact of those changes.

Assessment criteria

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

- describe technological change
- identify and track changes in design and technology
- demonstrate knowledge and understanding of the impact of technological change.

40 marks

Assessment task two

Design and construct a child's toy, musical instrument, model, ornament or other item using found materials such as cans, styrofoam, bottle tops, straws, plastic, ice block sticks, skewers.

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
- provide evidence of investigation when designing/planning
- 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.

60 marks

Total: 100 marks

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

- 9.1 Technical Drawing
- 9.2 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

- 10. 1 Building Construction 1

Grade 10 units - Options

- Building Construction 2
- Welding Technologies
- Plumbing Technologies
- Metal Technologies
- Concrete Technologies
- Electrical Technologies
- Integrated Technologies
- Timber Technologies 1, 2, 3, 4, 5
- School Developed Units
- Vocational Education And Training Units

Unit learning outcomes mapped to broad learning outcomes						
BLOs	1 Use the design process to produce appropriate solutions	2 Apply safe and appropriate codes and practices in the classroom	3 Apply knowledge and understanding of processes 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 Technical Drawing	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	9.1.1 Apply technical drawing techniques to produce a range of appropriate drawings		9.1.1 Apply technical drawing techniques to produce a range of appropriate drawings
9.2 Working with wood	9.2.4 Use the design process to produce appropriate solutions	9.2.1 Apply safe and appropriate codes and practices in the classroom	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.	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.
All option units selected will have a variation of the following learning outcomes						
	Use the design process to produce appropriate solutions	Apply safe and appropriate codes and practices in the classroom	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 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 including universal symbols
- 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 portfolio

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

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.

60 marks

Assessment task two

Written response test

Students will be required to answer a number of short answer questions that test their level of understanding of the concepts introduced in the unit.

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.

40 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 and evaluating a product using wood. The unit focuses on the introduction of basic skills and processes used in the construction of wooden items. The unit involves students in the creative manipulation of materials through the safe use of basic 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
- 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 Papua New Guinea - types of timber, structure, defects
- conversion of timber - seasoning of timber, preservation of timber, laminates
- fittings and hardware used with timber - hinges, handles, catches, locks.

Tools

The function of specific tools related to working with wood such as:

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

Parts of specific tools and machines

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

- marking out and measuring - pencil, marking knife, marking gauge, mortise gauge, steel rule, folding rule, steel tape, try squares, fixed tri and mitre square, mitre set, sliding bevel, combination square
- cutting, boring, abrading and percussion
- joining - 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 - 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 - face, edge, width, thickness, length
- cutting
- joining - common joints, widening, framing
- shaping
- finishing – sanding, wood filling, polishing, waxing, painting, varnishing, spraying
- industrial production methods.

Skills taught and learnt

- identifying, selecting and using appropriate materials for a project in working with wood
- selecting and correctly using tools for working with wood
- cutting, shaping and finishing wooden or timber products
- selecting and using appropriate techniques for the purposes of working with wood
- using appropriate surface preparations and finishes for wooden products.

Assessment

Assessment task one

Use the design process to design and make a product in wood.

Assessment criteria

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

- apply safe work practices
- use appropriate materials and processes to make the product
- select and use with skill tools and techniques to make the product
- produce a wooden product which meets the design brief.

60 marks

Assessment task two

Produce a design portfolio showing the steps undertaken in the making of the product.

The design portfolio might include:

- results of investigation
- rough notes or sketches of design ideas
- timelines
- final drawings or plans
- evaluation notes or report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in working with wood.

20 marks

Total: 100 marks

Option units Timber Technologies 1, 2, 3, 4, 5

10 weeks

Option units Timber Technologies are based on student interest. Teachers must provide, or develop with students, a design brief for the product/s to be completed during the term. Schools can develop units using the following unit framework and teach any aspects of timber technology that is relevant to their community and students. Schools may also select from appropriate vocational education and training units.

Schools could develop units such as:

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

Unit Framework

Learning outcomes for every option unit

Students can:

- apply safe and appropriate codes and practices in the classroom
- 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

Assessment task one

Use the design process to design and make a product using timber

Assessment criteria

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

- apply safe work practices
- use appropriate materials and processes to make the product
- select and use with skill tools and techniques to make the product
- produce a timber product which meets the design brief.

60 marks

Assessment task two

Produce a design portfolio showing the steps undertaken in the making of the product.

The design portfolio might include:

- results of investigation
- rough notes or sketches of design ideas
- timelines
- final drawings or plans
- evaluation notes or report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in working with timber.

20 marks

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 provided on the previous two pages, and teach any aspects of village technology that is relevant to their community and students. Schools could develop units such as:

- 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 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
- 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

- experimenting with combinations of materials considering their characteristics and properties
- identifying how materials have been used in innovative and non-traditional ways
- selecting and using a wide range of materials for the identified needs and opportunities of a design project
- exploring 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 Village Technologies option unit students complete the following assessment requirements:

Assessment task one

Use the design process to make at least two simple products or one complex product from a village technology.

Assessment criteria

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

- apply safe work codes and practices

- apply knowledge and understanding of village technologies by selecting and using appropriate materials and processes to make the product
- select and use with skill appropriate tools and techniques to make the product
- produce a product which meets the design brief

100 marks

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

10.1 Building Construction

Core Term 1

10 weeks

Building Construction is a prerequisite for 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 focuses on methods of construction and includes the use of common materials, basic hand tools, machines and construction techniques. Students experience design/problem-solving concepts through the development of a design project. They safely use and maintain 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
- 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.

Materials

Characteristics of building materials such as:

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

Tools

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

- marking out and measuring - 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 – 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 - 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 - cleaning, levelling, filling
- floor construction - 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 - types and components
- joinery and installation
- window and door construction - types and components
- cementing - mixing, finishing techniques, cutting
- plumbing - fastening, cutting, clamping and pinning
- preparation of timber - face, edge, width
- finishing - sanding, wood filing, polishing, waxing, painting, varnishing, and spraying.

Skills taught and learnt

- identifying, selecting and using appropriate materials for building construction project
- selecting and correctly using building construction tools for a design project
- preparing, cutting, shaping and finishing timber and other materials for construction purposes.
- select and use appropriate techniques for building construction project.

Assessment

Assessment task one

- Use the design process to plan and carry out a small building construction project such as a piggery or a model of a building.

Assessment criteria

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

- demonstrate understanding of and apply safe work codes and practices
- apply knowledge and understanding by selecting and using appropriate materials and processes to make the product
- select and use with skill appropriate tools and techniques to make the product
- produce a product which meets the design brief.

60 marks

Assessment task two

Produce a design portfolio showing the steps undertaken in the making of the product. The design portfolio might include:

- results of investigation
- rough notes or sketches or design ideas
- timelines
- final drawings or plans
- evaluation notes or report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in building construction

20 marks

Total: 100 marks

Grade 10 Option units

Building Construction 2

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. Building Construction 2 has the same learning outcomes and assessment requirements as Building Construction 1.

Welding Technologies

Plumbing Technologies

Cement Technologies

Metal Technologies

Electrical Technologies

The units Welding Technologies, Plumbing Technologies, Cementing Technologies, Metal Technologies and Electrical 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
- 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.

Assessment for every option

Assessment task one

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

Assessment criteria

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

- demonstrate understanding of and apply safe work codes and practices
- apply knowledge and understanding by selecting and using appropriate materials and processes to make the product
- select and use with skill tools, skills and techniques to make the product
- produce a product which meets the design brief

80 marks each unit

Assessment task two

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used.

20 marks

Total: 100 marks

Welding Technologies

Grade 10

Time 10 weeks

Welding Technologies focuses on principles of operation and methods of arc welding. The practical component involves the safe use and maintenance of welding tools and equipment, and safety in welding shops. Students use welding techniques to make a metal product using the design process.

Access to a welder, electrodes and safety shield and gloves is required.

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
- metal sheets
- safety equipment
- electrodes (core wire, flux coating).

Techniques

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

Skills taught and learnt

- welding skills and techniques
- selecting and correctly using appropriate equipment when welding
- demonstrating different welding skills

Design task

Use the design process to construct a metal product using welding.

Plumbing Technologies

Grade 10

Time 10 weeks

Plumbing Technologies is an option unit that follows Building Construction where students learn about plumbing and apply that knowledge through problem solving. The unit focuses on fastening techniques and the safe use of plumbing materials, tools, equipment and machines.

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 scribes
- 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

- selecting and using appropriate hand tools for plumbing tasks
- investigating and using accessories where appropriate for a plumbing project
- systematically planning for plumbing tasks.

Design task

Use the design process to construct a plumbing product which uses plumbing knowledge, skills and techniques.

Cementing Technologies

Grade 10

Time 10 weeks

Cementing Technologies focuses on simple concrete work, methods of repair and maintenance of cement products and provides students with the opportunity to learn about and use common cement materials, hand tools, equipment and machines.

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 – 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 – 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) – 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

- Selecting and using appropriate hand tools for cementing
- Systematically planning

Design task

Use the design process to construct a cement product which uses cementing knowledge, skills and techniques.

Metal Technologies

Grade 10

Time 10 weeks

Metal Technologies is designed to give students the opportunity to use the design process to make a product using metal. The unit focuses on methods in bench metalwork and sheet metalwork involving use of metals and materials, hand tools, equipment, metalworking machines and finishes.

Access to appropriate hand tools to safely cut, bend and join metal is required.

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

Techniques

Construction techniques including cutting, shaping, joining and finishing metals - edge treatment::

- wired edge
- rolled
- folded
- surface coating.

Skills taught and learnt

- selecting and using metals in the development of a design project
- selecting and correctly using appropriate hand and machine tools to make a metal product
- cutting, shaping and finishing metals.

Electrical Technologies

Grade 10

10 weeks

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

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

- Identifying and categorising common electronic components
- Selecting and using electronic components
- Selecting and correctly using tools of electronics technology
- Soldering efficiently
- Setting out and constructing simple circuits for a design project.

Home Economics

Home Economics units

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

Home Economics units can be taught in any order provided the core units are done before the option units for both Food Technologies and Fibres and Fabrics.

All units are designed to be taught in 10 weeks.

Fibre and Fabric Technologies – Grade 9 or 10

Grade 9 or 10 core

- Fibres and Fabrics

Grade 9 or 10 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

Food Technologies – Grade 9 or 10

Grade 9 or 10 core

- Introduction to Food Technologies
- Food and Nutrition

Grade 9 or 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
- Appropriate vocational education and training units

Unit learning outcomes mapped to broad learning outcomes						
Broad Learning Outcomes	1 Use the design process to produce appropriate solutions	2 Apply safe and appropriate codes and practices in the classroom	3 Apply knowledge and understanding of processes 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
9.1	9.1.4 Use the design process to produce appropriate solutions	9.1.1 Apply safe and appropriate codes and practices in the classroom	9.1.2 Apply knowledge and understanding through identifying, selecting and using various fibres and fabrics	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 fibres or fabrics used to produce a product.	9.1.4 Use the design process to produce appropriate solutions 9.1.5 Evaluate the appropriateness of fibres or fabrics used to produce a product.
Grade 10 core and all option units have unit learning outcomes that are variations of the following						
	Use the design process to produce appropriate solutions	Apply safe and appropriate codes and practices in the classroom	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	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

Grade 9 or 10

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 focuses on safe use of all sewing equipment, practice of hand and machine sewing skills and completing different types of decoration and fastenings. Students demonstrate problem solving skills using fibres and fabrics through the design process which will enable meaningful learning.

Learning outcomes

Students can:

- 9.1.1 apply safe and appropriate codes and practices in the classroom
- 9.1.2 apply knowledge and understanding through identifying, selecting and using various fibres and fabrics
- 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 fibres or fabrics 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 fibres
- plant fibres.

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 garments
- 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

- Investigating fibre properties and fabric characteristics
- Selecting and using appropriate textile materials for a design project
- Selecting and correctly using appropriate tools, equipment and techniques for a textile project.

Assessment

Assessment task one

Use the design process to make textile products.

Assessment criteria

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

- apply safe work codes and practices
- apply knowledge and understanding by selecting and using appropriate materials and processes to make the product
- select and use with skill tools and techniques to make the product
- produce a product which meets the design brief

60 marks

Assessment task two

Produce a design portfolio showing all the steps undertaken in the making of the product/s. The design portfolio might include:

- results of investigation
- rough notes or sketches of design ideas
- final drawings or patterns
- samples
- evaluation notes or report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in sewing.

20 marks

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 focuses on the safe use of all sewing equipment, practice of hand and machine sewing skills, different types of embroidery and using fasteners. Students demonstrate problem solving skills through the design process which will enable meaningful learning.

Learning outcomes

Students can:

- apply safe and appropriate codes and practices in the classroom
- 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 Papua New Guinea.

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)
- Fasteners
 - hook and eye
 - press studs
 - buttons and button holes
 - zippers

- tape ties.

Skills taught and learnt

- Investigating properties and characteristics of a range of basic sewing techniques
- Selecting and correctly using appropriate tools, equipment and techniques for a sewing project.

Assessment

Assessment task one

- Use the design process to make a product or products using basic sewing techniques.

Assessment criteria

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

- apply safe work codes and practices
- apply knowledge and understanding by selecting and using appropriate materials and processes to make the product
- select and use with skill tools and techniques to make the product
- produce a product which meets the design brief

60 marks

Assessment task two

Produce a design portfolio showing all the steps undertaken in the making of the product/s. The design portfolio might include:

- results of investigation
- rough notes or sketches of design ideas
- final drawings or patterns
- samples
- evaluation notes or report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in sewing.

20 marks

Total: 100 marks

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

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. Using the unit framework following 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.

Unit Framework

Learning outcomes for every Textile Technologies option unit

Students can:

- apply safe and appropriate codes and practices in the classroom
- 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 Textile Technologies option unit

Assessment task one

Use the design process to design and make a product using fibres and/or fabric

Assessment criteria

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

- apply safe work practices
- use appropriate materials and processes to make the product
- select and use with skill tools and techniques to make the product
- produce a product from fibres and/or fabric which meets the design brief.

60 marks

Assessment task two

Produce a design portfolio showing the steps undertaken in the making of the product.

The design portfolio might include:

- results of investigation
- rough notes or sketches of design ideas
- timelines
- final drawings or plans
- evaluation notes or report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in working with fibres and fabrics.

20 marks

Total: 100 marks

10.1 Introduction to Food Technologies

Core Term 1, Grade 9 or 10 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 use it appropriately and competently. The students learn care and safety involved in using kitchen equipment and develop knowledge of safe and hygienic food preparation.

Learning outcomes

Students can:

- 10.1.1 apply safe and appropriate codes and practices in the classroom
- 10.1.2 apply knowledge and understanding through identifying, selecting and using various utensils, equipment, foods and processes
- 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:
 - different food sources
 - the foods that can be eaten raw such as fruits and vegetables
 - meat
 - seafood
 - milk and milk products
 - eggs
- cereal and cereal products
 - flour and foods produced from flour
- safe gathering, handling and storage of food in hot climates.

Equipment, utensils and appliances

- use, cleaning and care of stoves:
 - wood stoves
 - kerosene stoves
 - gas stoves
 - electric stoves.
- parts of a stove
- functions, correct and safe use of a variety of contemporary food utensils and appliances used for:
 - cutting
 - measuring
 - preparation
 - processing and cooking.
- recipes including format and abbreviations commonly used.
- maintenance routines for care of equipment and materials
 - regular maintenance - check electrical cords and plugs for faults, keep cutting edges sharp
 - storage of materials and equipment
 - cleaning materials and equipment after use
 - keeping kitchens clear and clean.

Techniques

- hygiene
 - personal
 - kitchen
 - food
- reasons for cooking food, ways of cooking food and the positive and negative effects on 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

- identifying common properties of food within each of the food groups
- selecting and correctly using a variety of appropriate food utensils and appliances
- selecting, interpreting and/or modifying/developing recipes for a design project

Assessment

Assessment task one

- Use the design process to make nutritious food products.

Assessment criteria

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

- demonstrate understanding of and apply safe and hygienic work codes and practices
- apply knowledge and understanding by selecting and using appropriate ingredients, equipment and processes to make the products
- select and use with skill equipment, tools and techniques to make the products
- produce products which meet the design brief

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the making of the products over the term including recipes with all the instructions needed for the making of the products.

The portfolio might include:

- results of investigations
- rough notes of ideas
- checklists
- plans and timelines
- recipes
- budgets
- evaluation notes or reports.

Assessment criteria

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

- provide evidence in the portfolio of investigation, ideas for menus or food products, ingredients and equipment used, and evaluation of the process and products

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of equipment, ingredients, skills, and processes used in working with food technologies.

20 marks

Total: 100 marks

10.2 Food and Nutrition

Core Grade 9 or 10

10 weeks

Food and Nutrition teaches students to design healthy food menus and produce food products using appropriate ingredients, utensils and equipment safely and competently. Students 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 nutritional value of menus.

Learning outcomes

Students can:

- 10.2.1 apply safe and appropriate codes and practices in the classroom
- 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
- Main food sources
- Recommended daily intake and how to use the information
- Nutrition-related diseases
- 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, smoking, salting
 - processing, fermenting and cooking.

Safety and hygiene

- Safe food preparation and techniques and hygiene standards
 - personal hygiene
 - kitchen hygiene
 - food hygiene
 - thawing, cooking times and temperatures.

Regulations in the food industry

Skills taught and learnt

- Selecting appropriate and nutritious food for a range of circumstances
- Selecting appropriate equipment and applying suitable techniques when preparing food
- Using safe and hygienic practices when handling and preparing food.

Assessment

Assessment task one

- Use the design process to make nutritious food products.

Assessment criteria

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

- demonstrate understanding of and apply safe and hygienic work codes and practices
- apply knowledge and understanding by selecting and using appropriate ingredients, equipment and processes to make the products
- select and use with skill tools and techniques to make the products
- produce products which meet the design brief.

60 marks

Assessment task two

Produce a portfolio showing the steps undertaken in the making of the products over the term including recipes with instructions for the making of the dishes or meals.

The portfolio might include:

- results of investigation
- plans, timelines and checklists of ingredients
- recipes/menus
- budgets
- evaluation notes or reports.

Assessment criteria

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

- Provide evidence in the portfolio of investigation, ideas for menus or food products, ingredients and equipment used, and evaluation of the process and products.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of food and nutrition.

20 marks

Total: 100 marks

Option Food Technologies 1, 2, 3, 4

10 Weeks

Food Technology option units teach students to produce food products using appropriate ingredients, tools and equipment safely and competently. Students apply the principles of food preparation and presentation and explore the relationship between health and food selection. Students demonstrate safe food practices and investigate the effect technology has on production and preservation of food. Students 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.

Using the framework provided on pages 54 and 55 in this Home Economics syllabus, 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.

Option Integrated Technologies

Grade 9 and 10

10 weeks

In this unit students will use a number of different technologies to produce a product. For example students may construct a simple tent using sewing, metalwork and construction skills; or students might make a gift pack of jam or biscuits they have made using food technologies, presented in a basket they wove using village technologies.

Learning outcomes

Students can:

- apply safe and appropriate codes and practices in the classroom
- apply knowledge and understanding through identifying, selecting and using various materials or processes
- 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

- Experimenting with combinations of a wide range of materials considering their characteristics and properties
- Identifying how materials have been used in innovative and non-traditional ways
- Selecting and using a wide range of materials for the identified needs and opportunities of a design project
- Exploring ways that tools can be safely used to achieve new results
- Experimenting with traditional and non-traditional techniques.

Assessment

Assessment task one

- Use the design process to make products from a variety of technologies.

Assessment criteria

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

- demonstrate understanding of and apply safe work codes and practices
- apply knowledge and understanding by selecting and using appropriate materials and processes to make the product
- select and use with skill tools and techniques to make the product
- produce a product which meets the design brief.

60 marks

Assessment task two

Produce a design portfolio showing all the steps undertaken in the making of the product. The design portfolio might include:

- results of investigation
- rough notes or sketches of design ideas, timelines
- final drawings or plans
- processes used to make the product
- evaluation report.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, materials and equipment used, and evaluation of the process and product.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of tools, materials, skills, and processes used in working with integrated technologies.

20 marks

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.

7. Entry unit Computer Basics 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.
8. Word Processing 1 has Computer Basics as a pre-requisite.
9. Presentation Graphics 1 and any option unit have both Word Processing 1 and Computer Basics as pre-requisites.
10. Keyboarding could be undertaken without completing any other unit. It would consist of formal training in keyboarding. Software is available to run this module as a Computer Aided Instruction type course. Students could use computers outside the classroom (e.g. Library computers). Keyboarding would be a good link to further vocational studies for students leaving school in year 10.

The option units allow classes to proceed at their own rate. If students complete the core units in less than the assigned time option units could be undertaken.

Grade 9

Core

- 9.1 Computer Basics
- 9.2 Word Processing
- 9.3 Presentation Graphics

Grade 9/10

Options

- Word Processing 2
- Databases
- Information Management
- Spreadsheets 1
- Spreadsheets 2
- The Internet
- School Developed Units

\

Unit learning outcomes mapped to broad learning outcomes						
BLOs	1 Use the design process to produce appropriate solutions	2 Apply safe and appropriate codes and practices in the classroom	3 Apply knowledge and understanding of processes 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 Computer Basics			9.1.1 Identify and demonstrate appropriate use of a range of hardware components and peripheral devices	9.1.2 Use a range of computer skills and techniques		9.1.2 Use a range of computer skills and techniques
9.2 Word Processing and Option Word Processing 2	9.2.2 Design, produce and evaluate appropriate word processing solutions to a range of problems Option - Design, create and evaluate word processed documents for a range of tasks	9.2.3 and option Use ethical practices when dealing with information and computer technology	9.2.1 Use word processing application for specific tasks Option - Use appropriate skills and techniques for word processing documents	9.2.1 Use word processing applications for specific tasks Option - Use appropriate skills and techniques for word processing documents	9.2.2 Design, produce and evaluate appropriate word processing solutions to a range of problems	9.2.1 Use word processing application for specific tasks Option - Use appropriate skills and techniques for word processing documents
9.3 Presentation Graphics	9.3.2 Design and create graphic presentations for a range of purposes	9.3.3 Use ethical practices when dealing with information and computer technology	9.3.1 Use a presentation graphics application	9.3.1 Use a presentation graphics application		9.3.1 use a presentation graphics application
Option Units Spreadsheet 1 & 2	Design, create and evaluate spreadsheet solutions to a range of problems Use skills and techniques to create spreadsheets	Use ethical practices when dealing with information and spreadsheet applications	Demonstrate an understanding of spreadsheets	Use skills and techniques to create spreadsheets	Design, create and evaluate spreadsheet solutions to a range of problems	Design, create and evaluate spreadsheet solutions to a range of problems
Option Databases	Design, create and evaluate simple databases		Use database programs	Use database programs	Design, create and evaluate simple databases. Justify decisions made when creating and querying databases	Design, create and evaluate simple databases

Unit learning outcomes mapped to broad learning outcomes						
BLOs	1 Use the design process to produce appropriate solutions	2 Apply safe and appropriate codes and practices in the classroom	3 Apply knowledge and understanding of processes 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
Option Unit – Information Management	Organise, analyse and evaluate information from electronic sources	Describe ethical practices used when accessing and retrieving information	Use problem-solving processes when accessing and retrieving information using computers	Use problem-solving processes when accessing and retrieving information using computers	Organise, analyse and evaluate information from electronic sources	Describe a range of past, current and emerging information and software technologies
Option Unit – The Internet		Describe ethical practices when accessing and retrieving information	Demonstrate knowledge and understanding of the internet	Search the internet for information	Justify decisions made when accessing information from the internet	Describe ethical practices when accessing and retrieving information Demonstrate knowledge and understanding of the internet

9.1 Computer Basics

Term 1

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 and word processing, spreadsheet and presentation graphics applications is essential.

Learning outcomes

Students can:

- 9.1.1 identify and demonstrate appropriate use of a range of hardware components and peripheral devices
- 9.1.2 use a range of computer skills and techniques.

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
 - monitor
 - hard drive
 - floppy drive
 - headphones/speakers
 - printer
 - CD-Rom
 - disk
 - 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 for 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
- open, view, and print documents
- print entire file
- use print preview
- format documents
- select font style and size.

File management

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

Presentation skills

- prepare a simple electronic presentation
- identify intended use
- create and edit slides/pages
- add and edit text (font, size, colour)
- add a suitable background
- change the look of your presentation
- arrange objects on the slide/page
- 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 simple spreadsheets
 - identify intended use
 - determine columns and rows
 - create simple calculation formulas
 - enter and edit data
 - save a spreadsheet as a new and/or existing spreadsheet and close the file.
- open, view, and print spreadsheets
 - print entire file
 - use print preview

Assessment

Assessment task one

Create at least three documents using a computer.

Assessment criteria

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

- select and use a range of computer skills
- demonstrate computer skills when creating the product

60 marks

Assessment task two

A practical test and a knowledge test. The practical test requires students to demonstrate a range of skills such as turning the computer on and off, naming and saving documents, organising files.

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
- demonstrate knowledge of computer applications

40 marks

Total: 100 marks

9.2 Word Processing

Term 2

10 weeks

In this unit students will learn the function and capabilities of what is probably the most widely used computer application, that is, word processing. 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 a word processing application is essential.

Learning outcomes

Students can:

- 9.2.1 use word processing applications for specific tasks
- 9.2.2 design, produce and evaluate appropriate word processing solutions to a range of problems
- 9.2.3 use ethical practices when dealing with information and computer 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 Computer Basics 1)

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

File management (review and extend Computer Basics 1)

- ethical use of computer files and programs
- 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 and 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

Assessment task one

- Use the design process to create word processed documents using a variety of word processing techniques.

Assessment criteria

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

- demonstrate understanding of and apply ethical work codes and practices
- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using a word processor
- select and use appropriate techniques with competence in the development of word processed documents
- produce solutions which meet the design brief.

60 marks

Assessment task two

Produce a portfolio (hardcopy or electronic) showing all the steps undertaken in the creation of the word processed document/s. The portfolio might include, for example:

- rough typed notes
- checklists
- progressive drafts with comments written by the teacher
- completed hardcopy product.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas, and software used, and evaluation of the process and finished word processed documents.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of word processing terminology and techniques

20 marks

Total: 100 marks

9.3 Presentation Graphics

Term 3

10 weeks

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

Access to a computer with a presentation graphics application is essential.

Learning outcomes

Students can:

- 9.3.1 use a presentation graphics application
- 9.3.2 design and create graphic presentations for range of purposes
- 9.3.3 use ethical practices when dealing with information and computer 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.

Presentation graphics

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

- design an electronic presentation
 - create and edit slides/screens
 - add and edit text (font, size, colour)
 - design a presentation using two 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
 - set up slide show (and hardware)
 - show slides
 - evaluating slides (content and appearance).

Assessment

Assessment task one

- Use the design process to create a presentation using a presentation graphics application.

Assessment criteria

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

- demonstrate understanding of and apply ethical work codes and practices
- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using a graphics application
- select and use appropriate techniques with competence in the development of graphics presentations
- produce graphics presentations which meet the design brief.

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the creation of the presentation. The portfolio might include, for example:

- rough notes about ideas
- checklists
- progressive drafts
- work samples with comments written by the teacher
- hard/electronic copy of the presentation slides.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas, applications and software used, and evaluation of the process and graphics presentation.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge and understanding of presentation graphics skills, techniques and applications.

20 marks

Total: 100 marks

Grade 9/10 Option Spreadsheets 1

10 weeks

In this unit students learn about the function and capabilities of a spreadsheet application such as Microsoft Excel. Students 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 core features of spreadsheets and their application.

Access to a computer with word processing and spreadsheet applications is essential.

Learning outcomes

Students can:

- demonstrate an understanding of spreadsheets
- design, create and evaluate spreadsheet solutions to a range of problems
- use ethical practices when dealing with information and spreadsheet applications

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.

Spreadsheet

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

- spreadsheets and their purpose
- 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
- ethical use of files and 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

Assessment task one

- Use the design process to construct a spreadsheet.

Assessment criteria

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

- demonstrate understanding of and apply ethical work codes and practices
- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using a spreadsheet
- select and use appropriate techniques with competence in the development of spreadsheets
- produce spreadsheet solutions which meet the design brief.

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the construction of the spreadsheet. The portfolio might include, for example:

- rough notes and drafts
- data
- spreadsheets drafts
- work samples with comments written by the teacher.

Assessment criteria

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

- provide evidence in the portfolio of investigation, ideas, applications and software used, and evaluation of the process and spreadsheet design.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge and understanding of terms, techniques and skills used in spreadsheets

20 marks

Total: 100 marks

Grade 10 Option Databases

10 weeks

In this unit students learn about data handling systems. Students learn the basic structure of a database and learn to use and query a database created by the teacher, and to create a simple database of their own. The emphasis of the unit is on developing skills at interrogating databases.

Learning outcomes

Students can:

- use database programs
- design, create and evaluate simple databases
- justify decisions made when creating and querying databases

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 the advantages and features of databases:

- databases and their purpose
- 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
 - search for specific data by field and sort
 - 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

Assessment task one

- Use the design process to develop a simple database.

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
- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and solutions using databases
- select and apply appropriate techniques in the development of data bases
- produce solutions which meet the database design brief.

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the creating and building of the database. The portfolio might include, for example:

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

Assessment criteria

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

- provide evidence in the portfolio of investigation, ideas, applications and software used, and evaluation of the process and product.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of data handling and databases.

20 marks

Total: 100 marks

Grade 10 Option Information Management

10 weeks

In this unit students will learn about accessing and retrieving information using computers. They will learn to use CD ROMS containing 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 databases are also needed. Use of electronic encyclopaedias is optional but recommended.

Learning outcomes

Students can:

- use problem-solving processes when accessing and retrieving information using computers
- organise, analyse and evaluate information from electronic sources
- describe ethical practices used when accessing and retrieving information

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 catalogues
 - define search parameters
- use a database
- use information retrieved from different types sources
- 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 information for accuracy, relevance, appropriateness, comprehensiveness, and bias

- prepare reports on analysis using a computer application (word processor, spreadsheet or presentation graphic tools).

Assessment

Assessment task one

- Access information for a purpose using a variety of information retrieval methods

Assessment criteria

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

- demonstrate knowledge and understanding of, and skills in, the responsible selection and ethical use of information
- demonstrate knowledge of and skills in experimenting, generating and communicating ideas and information
- select and apply appropriate techniques in the management of information
- produce solutions which meet the design brief.

60 marks

Assessment task two

Produce a portfolio (hardcopy or electronic) showing all the steps undertaken in the process of accessing and retrieving information. The portfolio might include, for example:

- typed unformatted notes
- information copied from electronic sources
- drafts
- CD ROMS used
- work samples with comments written by the teacher
- printed hardcopy.

Assessment criteria

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

- provide evidence in the portfolio of investigation, ideas, applications and software used, and evaluation of the information retrieved and the process used.

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of information management techniques and terminology.

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:

- use appropriate skills and techniques for word processing documents
- design, create and evaluate word processed documents for a range of tasks
- use ethical practices when dealing with information and computer 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
 - print to a different printer
 - 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

Assessment task one

- Use the design process to develop documents which include tables, lists and pictures, using a range of word processing skills and techniques.

Assessment criteria

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

- demonstrate understanding of and apply ethical work codes and practices
- demonstrate knowledge of and skills in researching, experimenting, generating and communicating creative design ideas and solutions using word processing
- apply a broad range of appropriate tools and techniques with competence in the development of word processed products
- produce solutions which meet the design brief.

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the developing of the word processed documents. The portfolio might include:

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

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas/drawings, applications and software used, and evaluation of the process and product

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of word processing techniques and terminology

20 marks

Total: 100 marks

Grade 10 Option Spreadsheets 2

10 weeks

In this unit students 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:

- use skills and techniques to produce spreadsheets
- design, create and evaluate appropriate spreadsheet solutions to a range of problems
- use ethical practices when dealing with information and computer 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 spreadsheets

- 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 set 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

Assessment task one

- Use the design process to develop spreadsheets using a range of spreadsheet skills and techniques.

Assessment criteria

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

- demonstrate understanding of and apply ethical work codes and practices
- demonstrate knowledge of and skills in researching, experimenting, generating and communicating creative solutions using spreadsheets
- apply a broad range of appropriate tools and techniques with competence in the development of spreadsheets
- produce solutions which meet the design brief.

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the developing of the spreadsheets. The portfolio might include, for example:

- rough notes
- collections of data
- checklists
- progressive drafts
- work samples with comments written by the teacher.

Assessment criteria

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

- provide evidence in the portfolio of investigation, design ideas, applications and software used, and evaluation of the process and spreadsheet solution.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge of spreadsheet applications and terminology

20 marks

Total: 100 marks

Option The Internet

10 weeks

In this unit students will learn about the development of the Internet (World Wide Web-WWW). Students will learn how to connect to an Internet Service Provider (ISP) and the internet. Students will learn how to search the internet 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 students' skills so that he/she can independently search the internet for usable and appropriate information.

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

Learning outcomes

Students can:

- demonstrate knowledge and understanding of the internet
- search the internet for information
- justify decisions made when accessing information from the internet
- describe ethical practices used when accessing and retrieving information from the internet

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 and applications

- the role / function and purpose of an ISP
- search engines and how to use them
- protection (anti-spyware tools, anti-phishing tools, content filtering applications, privacy / personal information protection tools, cookie / history washers, etc.)

Skills and techniques

- setting up an account and connect via modem or other connection method to an ISP
- using the main features of a web browser, including bookmarks and 'favourites'
- navigating through a web site using hyperlinks
- navigating to a web site directly using the site's URL
- searching the web for specific content using various web-search engines
- downloading and/or copying from internet sites.

Assessment

Assessment task one

- Use the internet as a source to produce a document/s containing a variety of information, images and diagrams.

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 ideas and solutions using the internet
- demonstrate knowledge and understanding of, and apply, ethical work codes and practices when using and accessing information
- apply a broad range of appropriate tools and techniques with competence when using the internet
- produce solutions which meet the design brief.

60 marks

Assessment task two

Produce a portfolio showing all the steps undertaken in the developing of the product.

The portfolio might include, for example:

- notes
- checklists
- WWW address of sites accessed
- drafts with comments written by the teacher
- web pages.

Assessment criteria

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

- provide evidence in the portfolio of investigation, ideas, websites and software used, and evaluation of the process and product.

20 marks

Assessment task three

A short test based on the topics in the unit.

Assessment criteria

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

- demonstrate knowledge and understanding of the internet and issues associated with use of the internet.

20 marks

Total: 100 marks

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.

Teaching and learning using an outcomes approach requires teachers to plan their teaching and assess learner performance in relation to outcomes using criteria derived from those outcomes. Assessment 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 Design and Technology, Practical Skills, Home Economics and Computing 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 Design and Technology, Practical Skills, Home Economics and Computing subjects, 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 Design and Technology, Practical Skills, Home Economics and Computing 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 the *Grade 10 Assessment, Examination and Certification Handbook*.