



Revised National Curriculum Statement Grades R-9 (Schools)

Teacher's Guide for the Development of Learning Programmes

Technology



DEPARTMENT OF EDUCATION

Department of Education

Sol Plaatje House

123 Schoeman Street

Private Bag X895

Pretoria 0001

South Africa

Tel: +27 12 312-5911

Fax: +27 12 321-6770

120 Plein Street

Private Bag X9023

Cape Town 8000

South Africa

Tel: +27 21 465-1701

Fax: +27 21 461-8110

<http://education.pwv.gov.za>

© 2003 Department of Education, Pretoria

ISBN 1 - 919975 - 10 - 1

This document must be read as part of the
Revised National Curriculum Statement Grades R-9 (Schools).

The Revised National Curriculum Statement Grades R-9 (Schools) includes:

1. An Overview
2. Eight Learning Area Statements:
 - Languages
 - Mathematics
 - Natural Sciences
 - Social Sciences
 - Arts and Culture
 - Life Orientation
 - Economic and Management Sciences
 - Technology

FOREWORD

The majority of South African teachers have grappled with an education system that has been in the throes of rapid transformation sparked by the student cohort of 1976. Throughout the 1980's, education served as one of the focal areas that characterised resistance to the injustices of apartheid.

The 1990's, and the advent of change characterised by negotiations, saw the education system enter the current period where changes in education reflected systematic initiatives, research-based programmes and policy-driven, large-scale transformation. Teachers are now challenged to exert their professional judgment, curriculum expertise, teaching prowess and management skills in the interest of learners, schools, communities and the nation.

We are convinced that teachers implementing Curriculum 2005 have gained skills, experience, knowledge and techniques that have provided them with a base for engaging with the Revised National Curriculum Statement Grades R-9 (Schools). This Teacher's Guide for the Development of Learning Programmes builds on and enhances that base.

The Revised National Curriculum Statement Grades R-9 (Schools) will be implemented in schools by means of Learning Programmes. Learning Programmes are structured and systematic arrangements of activities that promote the attainment of Learning Outcomes and Assessment Standards for the phase. Learning Programmes ensure that all Learning Outcomes and Assessment Standards are effectively pursued and that each Learning Area is allocated its prescribed time and emphasis. Learning Programmes are based on relationships amongst outcomes and Assessment Standards without compromising the integrity of Learning Areas.

These Guidelines have been produced as a support mechanism to teachers. Over time, teachers will enhance their capacity to develop their own Learning Programmes. These Learning Programmes will take cognisance of the diverse learning contexts, availability of resources, different learning styles, multiple intelligences of learners and the barriers learners may experience.

These Guidelines are geared to assist teachers in accommodating Learning Outcomes and Assessment Standards that are prescribed, yet create space and possibilities for the use of judgments and insights based on particular contexts and a diverse learner population. As insights that are informed by practice, research and refinement, emerge from these Guidelines, it is anticipated that over a period of time teachers will develop as curriculum leaders. The majority of teachers within the apartheid education system were not encouraged to be creative, imaginative and lead curriculum development and design. They were controlled followers and were forced to practise through prescription. As a consequence, many teachers were not participants in the exciting process of curriculum development.

The development of these Guidelines was rooted within the framework of the Revised National Curriculum Statement Grades R-9 (Schools). Therefore, it is expected that these Guidelines should be read within a sound understanding of the Revised National Curriculum Statement Grades R-9 (Schools).

Teachers, schools management teams, departmental officials, teacher unions, non-governmental organisations, community-based organisations and service providers are invited to use these Guidelines not as a doctrine but as an enabling mechanism that will contribute to the delivery of quality, life-long learning.



T.D. Mseleku
Director-General: Education

CONTENTS

SECTION 1: GUIDELINES FOR THE DEVELOPMENT OF LEARNING PROGRAMMES	1
1.1 INTRODUCTION	1
1.2 PURPOSE OF THE TEACHER'S GUIDE FOR THE DEVELOPMENT OF LEARNING PROGRAMMES	1
1.3 DEFINITIONS	2
1.3.1 Learning Programme	2
1.3.2 Work Schedule	2
1.3.3 Lesson Plan	2
1.4 THE PURPOSE OF A LEARNING PROGRAMME, WORK SCHEDULE AND LESSON PLAN	3
1.4.1 From the RNCS to the Learning Programme	3
1.4.2 From the Learning Programme to the Work Schedule	3
1.4.3 From the Work Schedule to the Lesson Plan	4
1.5 ISSUES TO BE CONSIDERED WHEN DEVELOPING LEARNING PROGRAMMES, WORK SCHEDULES AND LESSON PLANS	5
1.5.1 Philosophy and Policy	5
1.5.2 Principles Underpinning the Curriculum	5
1.5.3 Time Allocation and Weighting	6
1.5.4 Integration	6
1.5.5 Resources	7
1.5.6 Inclusivity and Barriers to Learning	7
1.5.7 Differences between Learning Areas and Learning Area Statements	7
1.5.8 Clustering of Assessment Standards	9
1.6 DEVELOPMENT PROCESS	10
1.6.1 Developing a Learning Programme	10
1.6.2 Developing a Work Schedule	11
1.6.3 Developing a Lesson Plan	12
1.7 ASSESSMENT	15
1.7.1 Nature of Assessment	15
1.7.2 Planning for Assessment	16
1.7.3 Assessment Strategies	17

SECTION 2: THE TECHNOLOGY LEARNING PROGRAMME	19
2.1 SYNOPSIS	19
2.1.1 Description of the Learning Area	19
2.1.2 Learning Area Context	20
2.1.3 Learning Outcomes	21
2.2 RELATIONSHIP BETWEEN OUTCOMES	23
2.3 ASSESSMENT STANDARDS	25
2.4 TEACHING AND LEARNING IN TECHNOLOGY	26
2.4.1 Teaching Strategy	26
2.4.2 Learning in Technology	27
2.5 ASSESSMENT IN TECHNOLOGY	28
2.5.1 Assessment as an Equity Issue	28
2.5.2 Comparing Assessment Quality	28
2.5.3 Management of Assessment	29
2.5.4 Assessment in Technology	29
2.5.5 The Relationship between Learning Outcomes and Forms of Assessment	30
2.6 OVERCOMING BARRIERS TO TEACHING, LEARNING AND ASSESSMENT	31
2.6.1 Language of Learning and Teaching (LOLT) and Other Language Issues	31
2.6.2 Capacity of Educators	31
2.6.3 Curriculum	32
2.6.4 Intrinsic Barriers to Learning (Disabilities within the Learners)	33
2.7 DEVELOPING A LESSON PLAN FOR TECHNOLOGY	34
SECTION 3: INTERMEDIATE PHASE	37
3.1 THE INTERMEDIATE PHASE LEARNER	37
3.1.1 The Intermediate Learner in Technology	37
3.2 LEARNING PROGRAMME OPTIONS IN THE INTERMEDIATE PHASE	37
3.2.1 What the Interregation of Learning Areas means	38
3.2.2 Implications for Planning	39
3.2.3 Options to be Considered	39
3.3 ILLUSTRATION OF A LEARNING PROGRAMME	40
3.3.1 Illustration of a Technology Learning Programme, Option 1	40
3.3.2 Illustration of a Technology and Natural Sciences Learning Programme, Option 2	42

3.4	ILLUSTRATIONS OF WORK SCHEDULES	43
3.4.1	Illustration of a Grade 6 Work Schedule for Technology	43
3.4.2	Illustration of a Grade 6 Work Schedule for Technology and Science	44
3.5	ILLUSTRATIONS OF LESSON PLANS	45
3.5.1	Illustration of an Intermediate Phase Science and Technology Lesson Plan	45
3.5.2	Illustration of an Intermediate Phase Technology Lesson Plan	46

SECTION 4: SENIOR PHASE	47
--------------------------------	-----------

4.1	THE SENIOR PHASE LEARNER	47
4.2	ILLUSTRATION OF A LEARNING PROGRAMME	47
4.3	ILLUSTRATION OF A WORK SCHEDULE	48
4.3.1	Illustration of a Grade 9 Work Schedule	48
4.4	ILLUSTRATION OF A LESSON PLAN	49

SECTION 5: LEARNING AND TEACHING SUPPORT MATERIALS (LTSMs)	51
---	-----------



SECTION 1

GUIDELINES FOR THE DEVELOPMENT OF LEARNING PROGRAMMES

1.1 INTRODUCTION

Curriculum and teacher development theories and practices in recent times have focused on the role of teachers and specialists in the development and implementation of effective teaching, learning and assessment practices and materials. In the Revised National Curriculum Statement Grades R-9 (Schools) (RNCS), mention was made of policy guidelines for Learning Programmes (RNCS, Overview, p.16). It has been agreed that these will now be called Teacher's Guide for the Development of Learning Programmes. As stated in the RNCS, the curriculum is to be implemented in schools by means of Learning Programmes. Teachers are encouraged to develop and implement their own Learning Programmes, and this should happen within the policy framework provided in the RNCS. This Teacher's Guide for the Development of Learning Programmes (hereafter called 'these Guidelines') have been developed to support teachers to do so.

Although this document is primarily written for **teachers** who have to develop their own Learning Programmes, cognisance is taken of the fact that other Learning Programme developers will also use these Guidelines.

1.2 PURPOSE OF THE TEACHER'S GUIDE FOR THE DEVELOPMENT OF LEARNING PROGRAMMES

These policy Guidelines have been developed at national level (with provincial participation) to assure that teaching, learning and assessment practices are developed effectively so that learners can achieve the Learning Outcomes as set out in the RNCS.

The purposes of these Guidelines are to guide teachers in the development of a Learning programme by:

- providing Guidelines to teachers on *how to* develop a Learning Programme;
- providing the ***essential features and underlying principles*** of a Learning Programme;
- promoting and encouraging adherence to the RNCS and support for its implementation; and
- providing a framework for teacher development and training.

These Guidelines are intended to be implemented in conjunction with other policies that promote and support education transformation so that the Critical and Developmental Outcomes, which underpin teaching and learning across the South African school curriculum, are attained. For example, the *White Paper 6: Special Needs Education – Building an Inclusive Education and Training System* needs to be read to provide background information on issues related to barriers to learning, as these have crucial impact on what happens in the classroom. The *Assessment Guidelines for Inclusive Education* document stresses the need for alternative teaching and assessment strategies, and provides recommendations on how to overcome barriers to learning. Addressing barriers to learning is an important responsibility of teachers when developing Learning Programmes.

These Guidelines also need to be read together with the RNCS. The RNCS contains Learning Area Statements for each Learning Area that spell out the Learning Outcomes (LOs) and Assessment Standards (AS) per grade and the Overview.

1.3 DEFINITIONS

The RNCS indicates that LEARNING PROGRAMMES should be organised as follows:

- Planning for the whole phase. This is called a **Learning Programme**.
- Planning for a year and grade within a phase. This is called a **Work Schedule**.
- Planning for groups of linked activities or single activities. These are called **Lesson Plans**.

1.3.1 Learning Programme

A **Learning Programme** is a *phase-long plan* that provides a framework for planning, organising and managing classroom practice for each phase. It specifies the scope for teaching, learning and assessment for the phase and is a “structured and systematic arrangement of activities that promote the attainment of Learning Outcomes and Assessment Standards for the Phase” (RNCS Overview, 2002). A Learning Programme is a tool for ensuring that the Learning Outcomes for each Learning Area are effectively and comprehensively attended to in a sequential and balanced way across the phase.

The Learning Programme thus interprets and sequences the Learning Outcomes and Assessment Standards as spelt out in the RNCS into planned teaching, learning and assessment activities for a phase. It spells out what core knowledge and concepts will be used in attaining the Learning Outcomes for the phase. It plans for how different contexts and local realities, like the needs of the community, school and learners, will be considered.

The Learning Programme also considers how integration within and across Learning Areas will happen, as well as what resources are available and needed to deliver teaching and learning activities.

A Learning Programme will in turn, be translated into yearlong, grade specific **Work Schedules** and shorter activity-long **Lesson Plans**.

1.3.2 Work Schedule

A **Work Schedule** is a *yearlong programme* that shows how teaching, learning and assessment will be sequenced and paced in a *particular grade*. It is a delivery tool, a means of working towards the achievement of the Learning Outcomes specified in the Learning Programme, and incorporates the Assessment Standards that will be achieved in that grade.

1.3.3 Lesson Plan

A **Lesson Plan** is the next level of planning and is drawn directly from the Work Schedule. It describes concretely and in detail teaching, learning and assessment activities that are “to be implemented in any given period[of time]” (RNCS Overview, 2002). A Lesson Plan could range

in duration from a single activity to a term's teaching, learning and assessment and, in terms of actual time, may last from a day to a week or a month. It includes *HOW* (i.e. teaching style, approach and methodology) teaching, learning and assessment activities are to be managed in the classroom.

1.4 THE PURPOSE OF A LEARNING PROGRAMME, WORK SCHEDULE AND LESSON PLAN

Learning Programmes, Work Schedules and Lesson Plans represent different stages of planning. While the team of teachers that teach in a phase develops a Learning Programme, the teachers of a particular grade within a phase develop a Work Schedule from the Learning Programme. The class/Learning Area teacher, in turn, develops the Lesson Plans for his/her class. At each level of planning more detail is added to that of the previous level as is described below. Quite apart from the detail shown at each stage, the whole process is informed (at each level) by the same and very important factors described in 1.5.

1.4.1 From the RNCS to the Learning Programme

A Learning Programme translates the RNCS into phase-long plans that detail (at a minimum):

- The sequencing of Learning Outcomes and Assessment Standards across the phase to ensure a coherent teaching, learning and assessment programme;
- The core knowledge and concepts or knowledge foci selected to be used to attain the Learning Outcomes;
- The context that ensures that teaching and learning is appropriate to the needs that exist in the community, school and classroom; and
- The time allocation and weighting given to the different Learning Outcomes and Assessment standards in the phase.

When developing the Learning Programme teachers also need to *consider*:

- how integration within and across the Learning Areas will happen;
- the resources needed and those to be used when determining the teaching, learning and assessment activities; and
- any special or national events likely to be included in the school calendar.

These considerations are taken to more depth and given much more detail when planning the Work Schedule and Lesson Plans.

A team planning approach will promote coherence, integration and cohesion in the Learning Programme for the phase. Such an approach also provides for a framework for the development and effective use of Learning and Teaching Support Materials.

1.4.2 From the Learning Programme to the Work Schedule

A Work Schedule provides the teachers in a grade with a yearlong programme based on the Learning Programme. It develops on the sequencing, context, and core knowledge and concepts choices made at Learning Programme level. The teachers responsible for the Learning Programme for a particular grade within a phase will produce the Work Schedule for their grade

group by drawing on the Learning Programme for that phase.

In addition to the detail already provided in the Learning Programme, teachers will in developing the Work Schedule, plan:

- The assessment programme for the year. They will need to ensure a spread of different assessment forms across the year in keeping with the assessment guidelines for each Learning Area;
- The use of resources needed; and
- Integration within and across Learning Areas.

1.4.3 From the Work Schedule to the Lesson Plan

The Lesson Plan provides detailed structure for teaching, learning and assessment activities. It could range from a single lesson to a few months of activities. It provides the day-to-day details for teaching, learning and assessment. It also enables, for example, events of major importance internationally, nationally or locally, to be incorporated in the curriculum in a structured, yet flexible way. The World Summit on Sustainable Development held in Johannesburg in 2002, national commemoration and holidays, and other examples are opportunities around which a Lesson Plan could be built. The Lesson Plans are designed to ensure opportunities for learners to achieve the Learning Outcomes and Assessment Standards of that Learning Area.

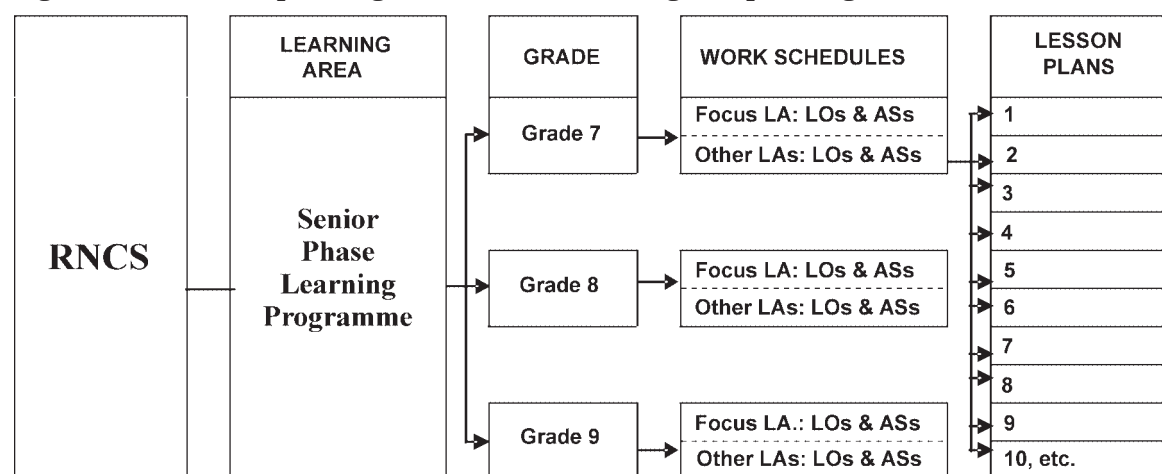
The following elements should be contained in the Lesson Plan:

- Those elements already determined in the Learning Programme and Work Schedule, namely:
 - ▶ The Learning Outcomes and Assessment Standards,
 - ▶ The context and/or core knowledge and concepts selections for the lesson,
 - ▶ The assessment tasks to be used in the lesson,
 - ▶ The resources needed for the lessons, and
 - ▶ Integration opportunities;
- The actual dates over which the Lesson Plan will stretch;
- Conceptual links to previous and future Lesson Plans;
- Details and sequencing of the teaching, learning and assessment activities that will make up the Lesson Plan;
- Any particular teaching approach and method to be used; and
- Special and important notes regarding the needs of the learners in the class for whom the teacher is preparing the Lesson Plan.

Individual teachers will prepare their own Lesson Plans to support teaching, learning and assessment in their particular classrooms.

The figure below indicates the relationship among the three different stages of planning.

Figure 1: Relationship among the three different stages of planning.



NOTE: In the above diagram Lesson Plans are only indicated for Grade 7, but would also appear alongside Grades 8 and 9 in the final column when the Learning Programme has been planned in its entirety.

1.5 ISSUES TO BE CONSIDERED WHEN DEVELOPING LEARNING PROGRAMMES, WORK SCHEDULES AND LESSON PLANS

The aim of a Learning Programme is to design and sequence teaching, learning and assessment activities that will result in meaningful and relevant learning. Teachers need to find ways of making the planning process a manageable one, so that the process of planning is facilitative rather than being a tedious task. For example, there is not much point in rewriting Learning Outcomes and Assessment Standards each time an activity is developed. Numbering the Assessment Standards and then referring to the numbered Assessment Standards may be easier.

To achieve the aim of Learning Programmes, Work Schedules and Lesson Plans, the following aspects have to be considered during planning:

1.5.1 Philosophy and Policy

- The RNCS is an embodiment of the nation's social values, and its expectations of roles, rights and responsibilities of the democratic South African citizen as expressed in the Constitution. Full discussion on this section is not included here as it is required that teachers read the RNCS for the discussion and detail on the philosophy and policy underpinning the RNCS.
- Outcomes-based education (OBE) philosophy and practice with the Critical and Developmental Outcomes is the underlying educational philosophy.
- Other national and local policies also impact on effective delivery.

1.5.2 Principles Underpinning the Curriculum

The RNCS is underpinned by principles that are crucial for working towards the aims of the education system. These are, amongst others:

- Social Justice
- a Healthy Environment
- Human Rights
- Inclusivity

In simple terms **social justice** refers to one's responsibility to care for others to the common good of society. Social justice serves to remind all humanity (government and civil society) that the needs of all individuals and societies should be met within the constraints imposed by the biosphere, and that all should have equal opportunity to improve their living conditions.

A **healthy environment** cannot be attained independent of people, their lifestyles and choices, their rights and social justice. Environment includes the social, political, economic and biophysical dimensions of all life and life-support systems (air, water and soil).

Human rights and their infringement are grounded in the daily experiences of people within their local environments. They are an inextricable part of our lives – so much so that we often take for granted the protection they offer us.

Inclusivity deals with a number of social justice and human rights issues, and at the same time taps into the rich diversity of our learners and communities for effective and meaningful decision-making and functioning for a healthy environment. Schools are encouraged to create cultures and practices that ensure the full participation of all learners irrespective of their cultures, race, language, economic background and ability. All learners come with their own experiences, interests, strengths and barriers to learning which need to be accommodated.

In developing Learning Programmes, educators and other curriculum developers will need to pay attention to these principles and to find ways of developing teaching, learning and assessment activities and providing Learning and Teaching Support Materials that offer learners opportunities to explore these principles.

1.5.3. Time Allocation and Weighting

- The RNCS overview document details the time allocated to each Learning Area in both the Intermediate and Senior phases, and to Learning Programmes in the Foundation Phase.
- These Guidelines also make recommendations with respect to how Learning Outcomes should be weighted with respect to each other.

To be able to develop Learning Programmes, teachers need to be aware of these allocations and weightings, as well as how these translate into hours and periods in the school(s) for which they are developing the Learning Programme.

1.5.4 Integration

Integrated learning is central to outcomes-based education. The historically fragmented nature of knowledge can be overcome if attention is paid to relevant integration both within Learning Areas, and across Learning Areas.

Teachers need to have a clear understanding of the role of integration within their Learning Programmes. The key, however, is the balance to be struck between integration and conceptual progression. That is, integration must support conceptual development rather than being introduced for its own sake. Teachers must therefore be aware of and look for opportunities for integration both within and across Learning Areas.

1.5.5 Resources

Different Learning Areas, and in turn different Learning Programmes, will rely on different resources for their success. Teachers will have to be familiar with the resources needed and the resources available as they develop their programmes. Care should be taken not to develop Learning Programmes where lack of access to resources will discriminate against learners. Teachers must also be sensitive to the limitations of learners who experience barriers to learning and how their progress may be affected by availability of resources.

1.5.6 Inclusivity and Barriers to Learning

The RNCS assumes an inclusive approach to teaching, learning and assessment. Learning Programmes need to address any barriers that learners for whom the programme is being developed may experience. Teachers need to be aware of the social, emotional, physical and other needs of the learners as they develop their Learning Programmes. For ensuring that matters of Inclusivity are addressed, teachers need to consider any particular barriers to learning and/or assessment that exist in different Learning Areas and make provision for these when developing Learning Programmes.

1.5.7 Differences between Learning Areas and Learning Area Statements

While each of the Learning Area Statements has been developed according to the same framework and philosophy, careful examination will show that subtle differences exist between them. These differences are a natural consequence of the peculiarities of each of the Learning Areas. The implication of the differences between Learning Areas and Learning Area Statements for Learning Programme, Work Schedule and Lesson Plan development is that such development in each Learning Area will have to take note of these peculiarities. Furthermore, as teachers in one Learning Area look for integration opportunities with other Learning Areas, they should be aware of the peculiarities of those other Learning Areas.

Some of the most striking differences are the following:

Natural Sciences has a separate chapter (chapter 5) in the Learning Area Statement that lists “Core Knowledge and Concepts” – these provide the context in which at least 70% of teaching, learning and assessment should take place, the other 30% can come from local contexts. The Core Knowledge and Concepts are presented by phase and organised into four main content areas or knowledge strands:

- *Life and Living*
 - ▶ Living Processes and Healthy Living
 - ▶ Interactions in Environments
 - ▶ Biodiversity, Change and Continuity
- *Energy and Change*
 - ▶ Energy Transfers and Systems
 - ▶ Energy and Development in South Africa

- *Planet Earth and Beyond*
 - ▶ Our Place in Space
 - ▶ Atmosphere and Weather
 - ▶ The Changing Earth
- *Matter and Materials*
 - ▶ Properties and Uses of Materials
 - ▶ Structures, Reactions and Changes of Materials

Technology does not have a separate chapter listing knowledge focus or contexts, but Learning Outcome 2 (Technological Knowledge and Understanding) identifies three core knowledge areas for the Learning Area and organises the Assessment Standards for the Learning Outcome accordingly:

- *Structures*
- *Processing*
- *Systems and Control*

It should also be noted that **Natural Sciences** and **Technology** have the same Learning Outcome 3 (Technology: Technology, Society and the Environment, and Natural Sciences: Science, Society and the Environment). This is a deliberate design feature of these two Learning Areas intended to facilitate integration between the Learning Areas, both short-term integration as well as the combining of the Learning Areas into one Learning Programme in the Intermediate Phase.

Social Sciences has a separate chapter (chapter 5) in the Learning Area Statement that lists the “Knowledge Focus Framework.” This is grade-by-grade specific and provides knowledge/topics for both History and Geography.

While **Arts and Culture** also does not have a separate chapter on knowledge, the Assessment Standards for each Learning Outcome are classified under the following “art forms”:

- *Dance*
- *Drama*
- *Music*
- *Visual Arts*
- *Composite*—only for some Learning Outcomes and only in some Grades

The Arts and Culture Learning Area Statement lists, furthermore, on pages 7 and 8 organising principles for each grade in each phase and for each Learning Outcome in each grade, a further organising principle for the Assessment Standards.

Languages do not have a list of knowledge contexts in the same way that some of the Learning Areas already mentioned do. However, lists of *recommended texts* are provided by grade in Chapters 2, 3 and 4 of the Learning Area Statement.

1.5.8 Clustering of Assessment Standards

Teachers, when planning assessment activities, recording learner performance and reporting on learner progress will look to the Assessment Standards for descriptions of the level at which learners should demonstrate their achievement of the various Learning Outcomes. Having selected the Learning Outcomes and when planning teaching, learning and assessment, teachers may find that certain Assessment Standards can be grouped or **clustered** together quite naturally.

In **some Learning Areas** (certainly not all), it would not be practical to teach to each and every Assessment Standard for each Learning Outcome. Firstly, the Assessment Standards in those Learning Areas do not stand alone, and secondly, there are simply too many Assessment Standards per Learning Outcome for the teacher to be able to deal with them individually. In such cases, the teacher on examining the Assessment Standards, may realise that they group quite naturally into **clusters** of Assessment Standards. These clusters can in turn be used for planning.

For example, in Mathematics in the Intermediate Phase, there are some eleven Assessment Standards for Learning Outcome 1 (Numbers, Operations and Relationships). An examination of these Assessment Standards suggests that they can quite naturally be organised into the following Assessment Standards clusters:

- Recognising, classifying and representing numbers
- Applications of numbers to problems
- Calculation types involving numbers
- Properties of numbers

The Mathematics Learning Area statement neither clusters nor suggests clustering. While the Mathematics Guideline does suggest clustering and even recommends possible clusters, it is up to the teacher to decide whether or not to cluster the Assessment Standards.

While the clustering of Assessment Standards is something that teachers may choose to do, the following should be noted when clustering Assessment Standards:

- Clustering of Assessment Standards should not occur across Learning Outcomes. Recording and reporting needs to be against Learning Outcomes and the selected Assessment Standards. Clustering Assessment Standards across Learning Outcomes would make reporting and recording impossible.
- Learning Outcomes are never clustered. While we may develop Lesson Plans with more than one Learning Outcome, we would consider this to be an example of integration and not clustering.
- When clustering Assessment Standards, it is not allowed that *new* Assessment Standards are written as a result of the clustering.
- While clustering of Assessment Standards is possible for planning the teaching, learning and assessment activities, teachers record learner performance against the individual Assessment Standards in that cluster.

Guidelines on how to deal with the Learning Outcomes and Assessment Standards of each Learning Area are provided in the Learning Area specific section of each Learning Area's Guideline.

1.6 DEVELOPMENT PROCESS

While the development process suggested in this document may appear tightly sequenced and ordered, teachers will, in practice, find themselves going back and forth between steps.

1.6.1 Developing a Learning Programme

Once teachers have taken all the philosophy, policy and other issues already described into account, the following steps are suggested as a more detailed guide for this task:

- *Select the Learning Outcomes*
The Learning Outcomes (and how they are attended to) are what drive the development process. It is important that teachers decide which Learning Outcomes are to be focused on at a particular time and how they are packaged together. The Learning Area specific section that follows will indicate how Learning Outcomes can be packaged or explored.
- *Identify Assessment Standards*
Teachers need to identify the Assessment Standards (or at least clusters of standards) for each Learning Outcome that will be targeted at a particular time within the Learning Programme. Assessment is planned to ensure that evidence is provided of how learners are performing against the Assessment Standards. When *recording* learner performance, teachers will show how each learner is meeting the Assessment Standard(s) and at what level the Learning Outcomes are being attained. Teachers will then *report* on every learner's performance and progress against the Learning Outcomes.

More detail on the assessment programme, forms of assessment, and recording and reporting processes for each Learning Area is provided in the Assessment Guidelines for the different Learning Areas.

- *Determine the teaching, learning and assessment context(s) and/or core knowledge and concepts*

Two main kinds of contexts have been identified for inclusion in Learning Programme development, and where appropriate teachers need to be explicit about these.

One level is the broad consideration of the social, economic, cultural and environmental contexts of the learners. This can also include the local needs of the learners, of the school and the surrounding community.

The other level is the Learning Area with contexts unique to the Learning Area and the specifics required by the Learning Area (see 1.5.7 above). Such contexts are reflected in the kinds of examples used, the types of projects given, the language used, the barriers being addressed, and the teaching, learning and assessment activities. Context must make specific provision for learners with disabilities.

When dealing with core knowledge and concepts, teachers must select core knowledge and concepts that address the identified Learning Outcomes and Assessment Standards. In Learning Areas where this information is not provided, teachers need to determine their own.

- *Allocate time*

Teachers need to allocate appropriate weighting and allocation of time to each Learning Outcome and its associated Assessment Standards – as per the weightings discussed in the Learning Area specific sections of the document. It is also important to check that the time allocated to the Learning Programme is consistent with the time allocations of each Learning Area within the phase.

After this process, it is recommended that teachers should stand back and examine the Learning Programmes in terms of the various features discussed in this chapter. It is also important to analyse all the Learning Programmes for a phase so that implications of one programme on another in terms of learner work load can be resolved. In this way, it is imagined that the time allocation for each programme will be modified and finalised through continued reflection and refinement.

Learners who experience barriers to learning must be accommodated through flexibility in terms of time allocated to complete activities. Additional time may be given or alternatively learners may be allowed to complete their tasks at a later stage. There must be recognition of the fact that completing only part of the task also has value. These arrangements are planned as part of the individual support for each learner who has a barrier to learning.

- *Integration and resources*

Integration and the selection and use of resources have already been discussed in detail in 1.5.4 and 1.5.5 above. Teachers will also need to consider integration and resourcing when planning a Learning Programme. While they may only show the details regarding resources and integration in the Work Schedules, they must apply their minds to these issues at the time of Learning Programme development.

1.6.2 Developing a Work Schedule

A Work Schedule must be developed for each year in the Learning Programme. A Work Schedule gives a greater level of detail for each aspect or element of the Learning Programme and adds further detail with respect to other aspects.

It should be emphasized that the process of developing a Work Schedule should not be seen as a process that occurs in a linear way, but as a holistic and integrated process. The following should be considered when developing a Work Schedule:

- *Details from the Learning Programme*

In developing the Learning Programme decisions have already been taken about the sequencing of Lesson Plans, the Learning Outcomes and Assessment Standards that will be focused on by each Lesson Plan, the selection of contexts and/or knowledge and the time allocation to the Lesson Plans. If necessary the teacher(s) developing the Work Schedule may want to amplify these details.

- *Assessment tasks*

The Department of Education has developed Assessment Guidelines for each Learning Area. Among other details, these documents spell out the forms of assessment to be completed by each learner in each grade. At the time of planning the Work Schedule, the teacher(s) should decide when to use each of the assessment forms to ensure both their most appropriate application and to spread the assessment demands on the learners evenly across the year.

- *Resources required*

In developing the Work Schedules, teachers will need to consider in detail the resources that will be required for each Lesson Plan and may need to re-sequence units according to the availability of the resources.

- *Integration*

In developing the Work Schedule, teachers will have to consider in greater detail, matters of integration. In the case of integration across Learning Areas, this may include meeting with the teachers from the other Learning Area(s) to ensure that the anticipated integration is workable in terms of their respective Work Schedules.

1.6.3 Developing a Lesson Plan

Lesson Plans are developed from the yearlong Work Schedule by individual teachers. A Lesson Plan is assumed to be a complete and coherent series of teaching, learning and assessment activities. It can consist of a single activity or several activities spread over a few days or a number of weeks.

In as much as Learning Programme and Work Schedule design is influenced by philosophy, policy and several other factors already discussed in 1.5, Lesson Plan development is further informed by the classroom realities of the teacher's class.

Realities of the classroom that have an impact on planning a Lesson Plan include:

- *Learning styles*

Since different learners have particular and preferred learning styles, every class is certain to contain groups of learners who assimilate information and develop understanding in different ways. Before a teacher is able to develop a Lesson Plan s/he must have a clear sense of the different learning styles of the learners in the class. S/he must also have a sense of those activities that are likely to succeed with particular individuals or groups and those that are unlikely to, and must plan to accommodate all learners in the class.

- *Teaching approach and methodology*

Teachers must decide how they will approach their teaching and what methods they will use. The nature of the Learning Area often determines what approach and which methods will best support the teaching, learning and assessment activities in the particular Learning Area.

- *Barriers to learning*

While it is possible to list many different types of barriers to learning in general, not all of these will apply in every class. Similarly there may be barriers to learning that are particular

to individual learners only. When developing a Lesson Plan the teachers must have a clear sense of barriers to learning that exist in the class so that they can overcome these through the way in which they structure activities and also through the activities that they select.

- *Resources available to the school and class*

Different schools have access to different types of resources, and so while a particular Lesson Plan may work well in one school, it may fail in another because of a difference in the available resources — both types and quantity — available to teachers and their classes.

- *What learners already know*

It is important to be aware of the prior learning that is both required for different Lesson Plans and the levels of this prior learning present in the class for whom the teacher is developing a Lesson Plan. Learners could demonstrate different levels of knowledge and concept development from the same learning experience. What learners already know becomes an important point of departure for planning what will happen next in an activity.

At times teachers may wish to perform some form of baseline assessment to be able to establish the level of prior learning and accordingly plan appropriate support for the learners.

- *School policies*

In the same way that national education policy will impact on Learning Programme design, so too will the policies of the school impact on both the design of the Lesson Plan and its execution.

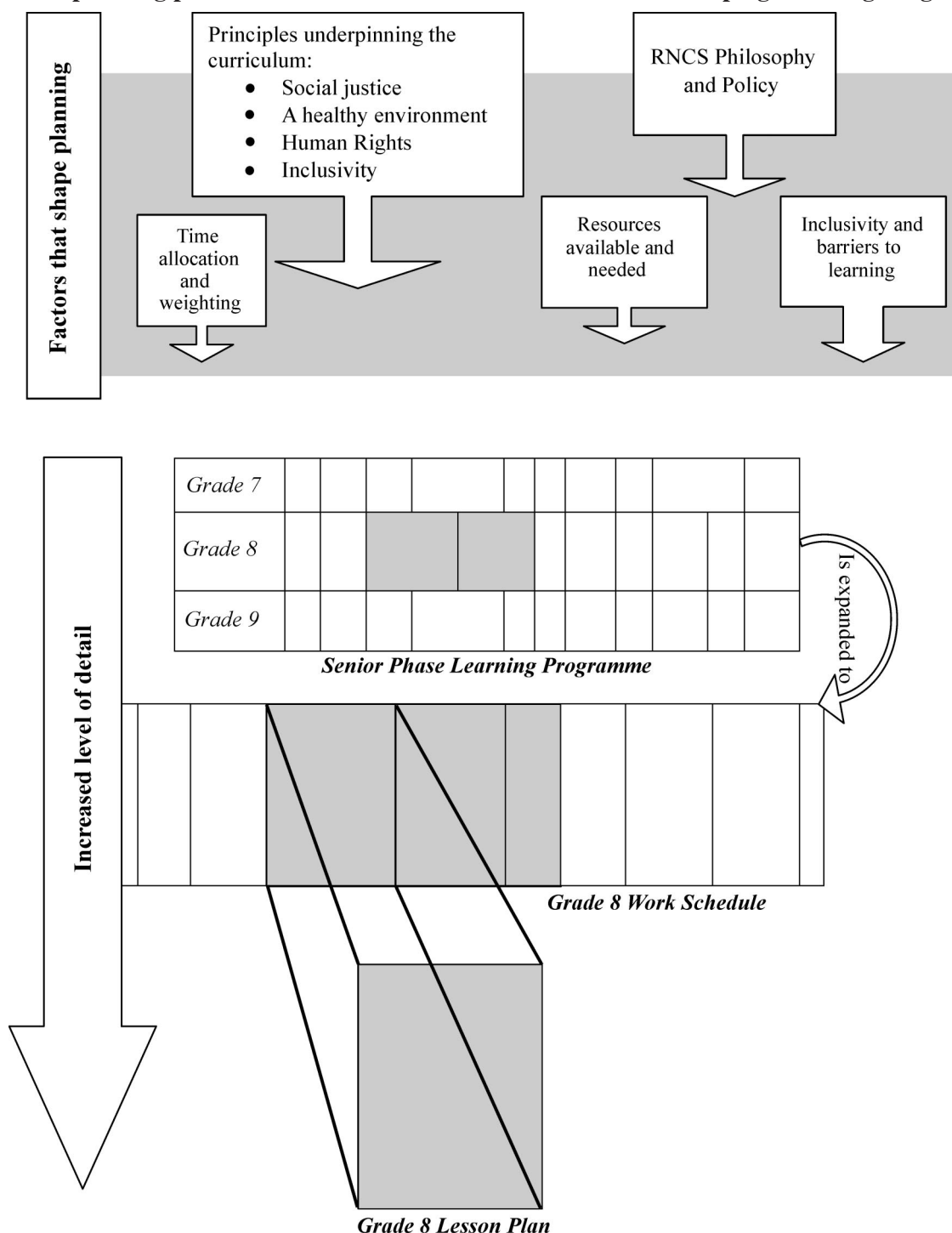
When the above issues have been considered, the teacher is finally ready to develop the Lesson Plan in detail. Within the planning, the teacher has to:

- ▶ Develop and/or source teaching, learning and assessment activities;
- ▶ Identify the role of outcomes and concepts from other Learning Areas;
- ▶ Decide on assessment strategies and select or develop instruments to be used; and
- ▶ Plan how to support learners who experience barriers to learning.

After a Lesson Plan has been developed, the execution remains. In the execution of a Lesson Plan the teacher will become aware of issues that may not have been anticipated. These will need to be incorporated and should, in turn, be considered when planning the next Lesson Plan(s). Like Learning Programme and Work Schedule development, Lesson Plan development is not a linear process, but rather one of continual modification, reflection, revision and refinement.

The figure below indicates the factors that inform the development of Learning Programmes, Work Schedules and Lesson Plans. It also shows how the levels of planning in a Learning Programme proceed from the RNCS to the Learning Programme to the Work Schedule to the Lesson Plan.

Figure 2: The planning process and factors taken into account when developing Learning Programmes.



1.7 ASSESSMENT

1.7.1 Nature of Assessment

The assessment requirements of the curriculum policy have presented strong challenges to most educators. This section is therefore provided to support the implementation of sound assessment practices.

The assessment practices that are encouraged through the RNCS for Grades R-9 (Schools) are continuous, planned and integrated processes of gathering information about the performance of learners measured against the Learning Outcomes. The level at which the learner is to be assessed is provided by the Assessment Standards which are progressive from grade to grade. A Learning Programme, Work Schedule and Lesson Plan design should ensure that assessment is an integral part of teaching, learning and assessment.

Planning assessment to include the assessment of learners who experience barriers to learning is important. It is likely that in every classroom there would be some learners who experience barriers to learning. However, these barriers will not always be the same and could be situated in the learning context, i.e. inflexible methodology, lack of resources or in the learners themselves, i.e. sensory, physical, intellectual disabilities or disease/illness. They can also arise from the social context, i.e. poverty, violence or difficult home conditions. When planning an assessment activity, the teacher should have a clear sense of the wide range of barriers that may inhibit learning and the achievement of the Learning Outcomes and how to address them. The key is to determine what exactly is being assessed, (i.e. concepts, application, skill) and to develop assessment tasks in such a way that learners have a variety of options to demonstrate their learning with respect to the Learning Outcomes and Assessment Standards as outlined in the RNCS. (For more details on alternative methods of assessment, please refer to *Curriculum 2005: Assessment Guidelines for Inclusion, May 2002.*)

Assessment should:

- enhance individual growth and development, monitor the progress of learners and facilitate learning;
- find out what a learner knows, understands and/or can do;
- make judgements based on valid and appropriate evidence – these judgements should then enable us to make well informed decisions about what a learner needs to learn next;
- give an indication of the success of the programme of learning including how appropriate resources have been;
- include a variety of techniques;
- encourage learners to go beyond simple recall of data or facts;
- close the gap between the classroom and the real world;
- include opportunities for learners to perform tasks and solve problems; and
- make provision for adaptive methods of assessment.

1.7.2 Planning for Assessment

Assessment cannot be neutral with respect to what is taught and learned. Any assessment is an expression of values on teaching, learning and assessment. We need to view assessment as a critical and integrated part of the teaching-learning process. As planning for teaching, learning and assessment activities begins with a Learning Programme, planning for assessment should also be integrated in these plans.

When planning for assessment the following documents should provide the framework for planning:

- The Assessment Policy for the General Education and Training Band, Grades R-9 and ABET (December 1998);
- The RNCS (The Overview and the Learning Area Statements);
- Assessment Guidelines for each Learning Area; and
- Assessment Guidelines for Inclusion.

The planning for assessment in the Learning Programme should give schools an indication of resources and time needed for assessment in that phase. To do this teachers need to know what knowledge, skills, attitudes and values the learners are expected to possess so that they are able to integrate the assessment programme within teaching and learning activities.

In a *Learning Programme* teachers need to:

- Mention all the **possible forms of assessment** they are likely to use in determining the achievement of the Learning Outcomes. In doing this also take the Assessment Standards into consideration;
- Mention the **resources** they are likely to need (including assistive devices);
- Take the **context and core knowledge and concepts** into consideration; and
- Indicate the **time** that will be needed.

In the *Work Schedule* planning for assessment focuses on a grade. When planning a Work Schedule considerations should be given to the following:

- Learning Outcomes give guidance by indicating **what** should be assessed;
- Assessment Standards indicate the **level** at which the Learning Outcome should be assessed;
- Indicate the **assessment strategies** or different forms of assessment teachers plan to use;
- Indicate the **resources** teachers will use; and
- Take into consideration the **diverse needs** of the learners.

In a *Lesson Plan* teachers should:

- Indicate **how** the Learning Outcomes would be assessed;
- Consider the **level** at which the Learning Outcomes would be assessed using the Assessment Standards;
- Also consider the **context**, the availability of **resources** and the **diverse needs** of learners; and
- Give a detailed description of how they plan to use the various **assessment strategy(ies)** and/or different form(s) of assessment, how these will be integrated within teaching and learning, and what will be recorded.

For each level of planning in the Learning Programme, the Work Schedule and the Lesson Plan, teachers need to describe the following clearly:

- **When** they are going to assess;
- **How** they are going to assess;
- What **resources** they are going to use; and
- How they are going to support the **diverse needs** of learners.

1.7.3 Assessment Strategies

A wide range of assessment strategies may be used to measure learner performance. Teachers can select these depending on the purpose of assessment. These will also depend on a specific Learning Area. The forms/types chosen must provide a range of opportunities for learners to demonstrate attainment of knowledge, skills, values and attitudes. The following are some of the various forms/types of assessment that could be used by the teachers to assess learner achievement:

- a) Tests
- b) Performance-based assessment
- c) Interviews
- d) Questionnaires
- e) Structured questions
- f) Assignments
- g) Case studies
- h) Practical exercises/demonstrations
- i) Projects
- j) Role-plays
- k) Simulations
- l) Aural/Oral Questions
- m) Observations
- n) Self-report assessment

These assessment strategies and the different forms of assessment for each of the Learning Areas are discussed at length in the Assessment Guidelines for each Learning Area.



SECTION 2

THE TECHNOLOGY LEARNING PROGRAMME

2.1 SYNOPSIS

Technology is concerned with the meaningful acquisition and integration of skills, knowledge and values and the application of various technology processes needed to solve problems in order to extend human capabilities. The essence of Technology is found in its definition:

‘The use of knowledge, skills and resources to meet people's needs and wants by developing practical solutions to problems, taking social and environmental factors into consideration.’

2.1.1 Description of the Learning Area

Some aspects of the definition can be explained as follows:

- *Knowledge:* In Technology, learners must know how things function and how to make them work. Knowledge of various technological concepts, concepts such as systems and control, materials and processing, structures and communication and how to apply them when developing solutions is vital for learners.
- *Skills:* Learners who study Technology should develop a variety of skills, including: manipulative skills (i.e. drilling, cutting, and joining — using and managing the correct hand tools and equipment), communicative skills (i.e. use of the appropriate vocabulary, graphic and written communication skills), cooperative skills (i.e. ability to contribute own ideas to the team, to work with others), planning skills (able to know what needs to be done, when, how, and within what constraints).
- *Resources:* Technological resources to be used in combination with knowledge and skills may include tools, time, people, money, information, energy and machines.
- *People's needs and wants:* Technology should not be divorced from people. It solves practical problems that relate to their every day life. It gives learners the confidence to address needs and wants, the opportunities to solve problems and to respond meaningfully to technological innovations.
- *Social and environmental factors:* Solutions that are developed should consider human-rights issues and the possible impact on the environment. Learners become aware of values and attitudes towards technology. They also learn to make decisions on what actions are needed when developing solutions. It enables them to understand and critically engage in the challenges that technology provides in their future roles as citizens, consumers, workers and parents in a developing South Africa.

2.1.2 Learning Area Context

The Importance of the Technology Learning Area

- *The economic reality*

We are in a global market and our economic growth is dependent on the international market. Global competitiveness requires that more and more learners take up technological careers so that they can design and produce products and innovations that we and other countries need. The export of South African products and technical expertise will improve our economy. Technology is important for growth in terms of social and economic development.

In the presentation of Technology, learners are provided with opportunities to interact with business various institutions and industries that will help them to understand and adapt to changing economic realities. They learn to generate creative and innovative ideas, and to co-operate in working to translate their ideas into action. They gain skills, knowledge, competencies and confidence that equip them to explore entrepreneurial initiatives that will enable them to contribute to South Africa's social and economic development. This also allows them to explore different opportunities for further education and their future careers.

- *Real life challenges*

Technology is concerned with solving practical problems by employing a variety of skills, available resources and knowledge. Skills and knowledge that are employed to develop practical solutions may be derived from other Learning Areas and general experiences. Technology transcends traditional Learning Area boundaries. Solutions to real life challenges demand an interdisciplinary approach and this is what Technology offers to learners.

Technology contributes to the intellectual and practical development of learners to cope with the challenges of a changing technological society. Through its open-ended, problem-solving approach Technology links knowing with doing and so affords learners opportunities to develop the ability to apply and integrate their knowledge and skills from other Learning Areas in real and practical situations. In this way they become both users and doers of Technology, an ability that can be applied and developed further in various situations throughout their lives. Technology needs a 'minds-on, hands-on and hearts-on' approach.

Technology offers authentic opportunities for learners to interact with their community and environment for linking school experiences with the wider world. By exposing learners to authentic problems they learn to make decisions, to take calculated risks, to evaluate their choices, and to find ways of addressing real world problems.

On a personal level, learners become more aware of their responsibilities within their school, their families and society in general. They gain confidence in their ability to make decisions about technological issues and to participate successfully as individuals and as group members in technological debates and activities.

- *Good citizenship*

Technology impacts on everybody's life. Technologically literate citizens are able to make decisions about the use and misuse of technology. With a high level of technological literacy all citizens will develop an understanding of the impact of technology on both the individual and the society and its implications for the interrelated social, economic and environmental factors of the country. Technological awareness gives rise to planned and deliberate actions to improve the benefits of technology on people and the environment, and to avoid undesirable results. Learners develop sensitivity towards the environment and learn to evaluate and act according to the appropriateness of technological solutions, thereby developing into the kind of critical consumers our society requires.

By engaging with Technological activities in the classroom, learners become aware of the different and valid ways in which people respond to technology and to innovation, and appreciate the impact that technological changes have on different groups of people. They develop understanding of the beliefs, values, and traditions of other people and how these influence technological development.

- *Consumerism*

In an increasingly technological world, the Learning Area should assist learners in their choices of, and in their understanding of the operation and care of the products and services available to them.

2.1.3 Learning Outcomes

Learning Outcome 1

Learning Outcome 1 in Technology is the main Learning Outcome and lists the Assessment Standards for technological skills. The learner will be able to apply technological processes and skills ethically and responsibly using appropriate Information and Communication Technologies.

This Learning Outcome addresses the first five Critical Learning Outcomes:

- Identify and solve problems and make decisions using critical and creative thinking.
- Work effectively with others as members of a team, group, organisation, or community.
- Organise and manage themselves and their activities responsibly and effectively

Assessment Standards in this outcome are organised under five integrated technological skills (process):

- Investigating
- Designing
- Making
- Evaluating
- Communicating

All the Assessment Standards, along with those for Learning Outcome 2 and Learning Outcome 3 below, can be achieved through project-based learning experiences that expose learners to all aspects of the Learning Area in an integrated way. Focussed activities may be used to access specific issues. Those activities should be aimed at developing specific skills.

Learning Outcome 2

Learning Outcome 2 in Technology is the outcome that lists the Assessment Standards for Technological Knowledge and understanding. The learner is able to understand and apply relevant technological knowledge ethically and responsibly.

The Assessment Standards in this outcome are organised under three content areas:

- Structures
- Processing
- Systems and Control

Learners should be able to demonstrate achievement of these Learning Outcomes. Assessment Standards in the process of completing practical project work.

Learning Outcome 3

Learning Outcome 3 in Technology (Technology, Society and the Environment) is the Learning Outcome that lists the Assessment Standards for technology in society. The learner will be able to demonstrate an understanding of the inter-relationships between science, technology, society and the environment.

The Assessment Standards, are organised under the headings:

- Indigenous Technology and Culture
- Impacts of Technology
- Bias in Technology

Learners should be able to demonstrate achievement of these Learning Outcomes Assessment Standards in contexts directly related to practical project work and in particular through investigating and evaluating particular aspects of project work found in Learning Outcome 1.

Learning Outcome 2 and Learning Outcome 3 address Critical Learning Outcomes 6 and 7

6. Use Science and Technology effectively and critically showing responsibility towards the environment and health of others.
7. Demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation.

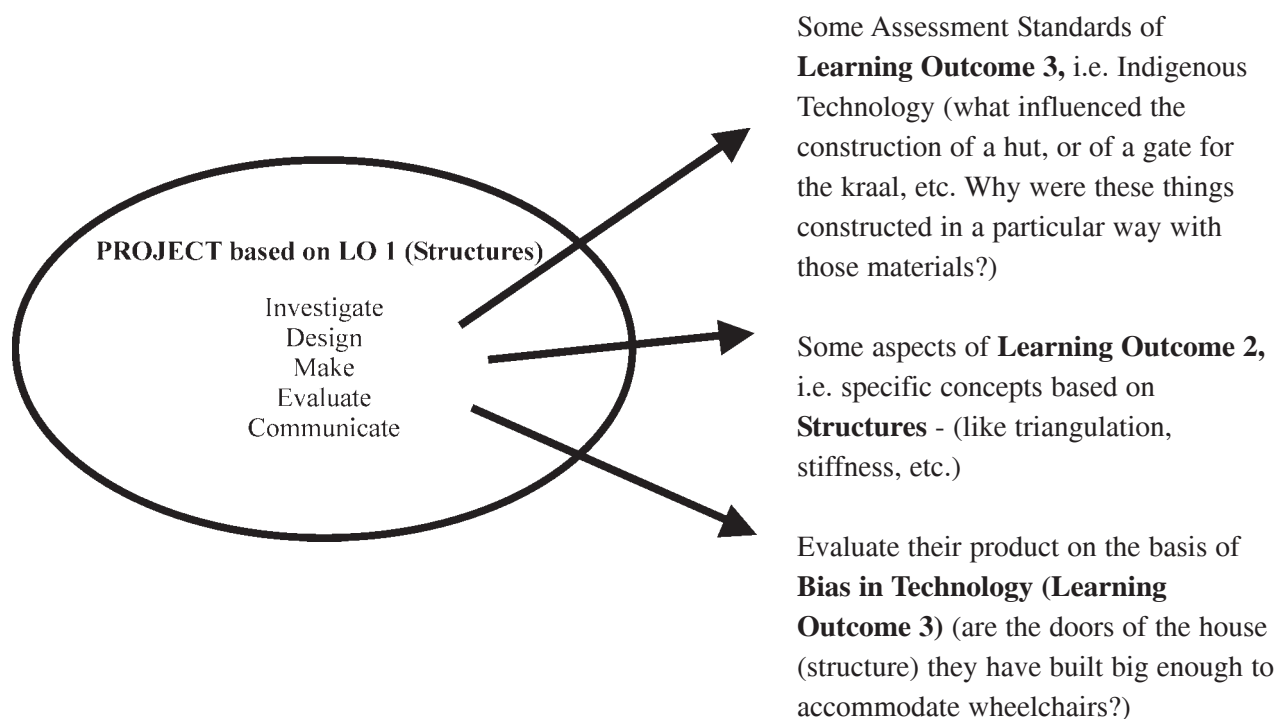
2.2 RELATIONSHIP BETWEEN OUTCOMES

All the Learning Outcomes are important and must be covered in each year. The Technology Learning Outcomes are totally integrated and should be delivered that way. Learning Outcome 1 should be used to integrate Learning Outcome 2 and Learning Outcome 3.

As the three Learning Outcomes of Technology are interrelated, various Assessment Standards from the three Learning Outcomes can be dealt with in one project, but this should be done in such a way that the learning experience is cohesive and forms a unit. Clustering of Assessment Standards (as they fit naturally in a given context) should decrease the workload of assessing them.

It is good practice in Technology to integrate Assessment Standards from different Learning Outcomes. This will allow the assessment of naturally related issues to be done together.

For example: Learners, say in Grade 6, may be presented with a problem related to housing. Possible solutions will involve structures. When assessing the research phase of the learner activities, the assessor/s should consider Assessment Standards listed under Learning Outcome 1 (the main outcome), as well as the Structures Assessment Standard from Learning Outcome 2, and one or more of those from Learning Outcome 3. Look at the example below:



The **investigation aspect** of the design process is broad and can also focus on certain aspects in different Learning Outcomes. In the above example, learner investigations can include:

- *The background context:* When given a problem, need or opportunity a designer considers the advantages and disadvantages that a technological solution might bring to people and the environment. Learners may, for example, investigate the main reason that gives rise to the need to build a hut. They will list possible advantages of erecting such a structure; they will also indicate what possible problems may be caused to the environment.

- *Existing products* relevant to a problem, need or opportunity and they may compare their own design considerations (who is it for, what is it for, what does it look like, what is it made of, how well it works, will it affect the environment).
- *Knowledge and understanding of materials* suitable for supporting loads (stiffness, strength). They consider how structures can be made stable (base size, ground anchors) and how they can be reinforced (using appropriate cross sections, cross braces, triangular webs, folding).
- *Indigenous Technology*: They describe similarities in problems and solutions in their own and other societies, past, present and future. Further technology addresses indigenous practices, engagement and sustainability.
- *Technological impacts*: They suggest ways to improve technological products or processes to minimise negative effects on people and/or the health of the environment.
- *Biases in Technology*: They suggest how technological products or services can be made accessible to those presently excluded.

Learning Outcome 1 is the main Learning Outcome of Technology. It reflects the essence of the Learning Area and is thus weighted more heavily than the other two. Learning Outcome 2 and Learning Outcome 3 carry the same weighting emphasis. It follows thus that Learning Outcome 1 requires more time than either of the other two. However, all the Learning Outcomes need to be addressed in an integrated manner. All the Learning Outcomes in Technology are important as they compliment each other and therefore they cannot be taught in isolation.

Learning Outcome	Focus	Weighting	Description
1	Investigate Design Make Evaluate Communicate	50	The application of the Design Process forms the basis of all Technological projects/tasks/activity. This Learning Outcome carries more weight than the other two.
2	Structures Processing Systems and Control	25	This outcome deals with the construction and application of knowledge and skills in Technology. It is equally weighted with Learning Outcome 3 below.
3	Indigenous Technology and Culture Impact of Technology Bias in Technology	25	This outcome provides the research component into the interaction between technology and society. It is equally weighted with Learning Outcome 2 above.

2.3 ASSESSMENT STANDARDS

Features of the Assessment Standards for Technology

The table below gives a summary of the Assessment Standards in Technology. Please note that the table reflects **only the essence** of the Assessment Standards. For specific details of the Assessment Standards **for each grade** you **MUST** refer to the Learning Area Statement.

A complete list of Learning Outcomes and their associated Assessment Standards is reflected in the RNCS.

Summary of the essential features of the Assessment Standards for Technology

TECH - LO1	TECH - LO2	TECH - LO3
Investigate: <ul style="list-style-type: none"> Finds information regarding a problem or need. Investigates (evaluates) existing related products. Performs practical tests. Uses appropriate Information and Communication Technology. 	Structures <ul style="list-style-type: none"> How materials can be used to make and reinforce structures. 	Indigenous Technology <ul style="list-style-type: none"> How different cultures have used materials, solved problems and optimised solutions.
Design: <ul style="list-style-type: none"> Writes a clear statement summarising the need. Writes Specifications. Suggests possible solutions. Chooses one with reasons. 	Processing <ul style="list-style-type: none"> How materials can be processed to improve their properties. 	Impacts <ul style="list-style-type: none"> How solutions impact on society and the environment.
Make: <ul style="list-style-type: none"> Planning. Making skill. Safety and working practice. 		
Evaluate: <ul style="list-style-type: none"> Evaluates products and suggest improvements. Evaluates the process and suggests improvements. 	Systems and Control <ul style="list-style-type: none"> How mechanical systems work to gain advantage. How electrical/electronic systems work. 	Bias <ul style="list-style-type: none"> How solutions might disadvantage certain groups and possible ways of redressing bias.
Communicate: <ul style="list-style-type: none"> Produce sketches and drawings. Make presentations using ICT. 		

Technology Assessment Standards are based on principles listed in the RNCS, for example:

- Some Assessment Standards focus on Critical Learning Outcomes
- Some provide opportunities to investigate indigenous technologies and
- Others encourage the learner to design with a health and friendly environment in mind.

Example of Assessment Standards that encapsulate some of these ideals are as follows:

- 'Suggests and records at least two alternative solutions to the problem, need or opportunity, that link clearly to the design brief and to given specifications and constraints.'

2.4 TEACHING AND LEARNING IN TECHNOLOGY

Teaching and learning in Technology must be aimed at developing Technological Literacy so that learners are empowered to cope with the challenges of a technological society. As all developments manifest themselves in economic, political, social and natural environmental contexts, there is a need for an understanding of the interconnections between technology and these environments.

Inherent in the development towards technological literacy is technological capability. In the South African Technology curriculum, developing problem-solving skills lies at the heart of capability. With this approach to satisfying needs and wants we need to be aware of the costs and benefits of our choices.

2.4.1 Teaching Strategy

The operational approach to Technology is project based, i.e. coherent units of work spread over an extended period of time. However, within a longer project opportunities for shorter, more structured and focused tasks should be created that aim at building specific skills and knowledge. All Technology projects and learning activities should develop learners' capability in the three Learning Outcomes. Because of the integrated approach to the curriculum in Technology, assessment activities can and should address one or more Assessment Standard/s from all of our Learning Outcomes. The Assessment Standards will not all be addressed all of the time and it is not expected, nor appropriate, that all the Assessment Standards will be assessed every time.

Given that developing capability is a process, learners should be given multiple opportunities to demonstrate competencies in the Learning Outcomes. In Technology we should focus on the development of transferable skills leading to an interactive, process approach to solving problems in a range of contexts. If we are to achieve any measure of success, then teaching and learning requires that we actively develop abilities in communicating, making choices, questioning techniques, data and information interpreting, methods and techniques for experimenting, skills for criterion based evaluating, strategies for reasoning, etc.

In teaching Technology the shift should be towards learning-centeredness. The educator should introduce new ideas and then provide support for the learners to make sense of these for themselves.

Experiential learning is a powerful tool in ensuring meaningful learning in Technology. 'Hands-on' in Technology must be taken to refer to learning-through-experiences i.e. through practical engagement in investigating, designing, making, evaluating and communicating ideas and plans.

2.4.2 Learning in Technology

In the early years of Technology, learners need to practice activities that will enhance their fine motor co-ordination. Manual dexterity and the safe use of simple tools for cutting, shaping, folding and joining materials like paper and card should be developed during this stage, and simple measuring skills can be taught and practiced. Learners should be encouraged to think creatively and critically as they design and make artefacts. safety precautions should be encouraged amongst learners at all times.

During the next stage of development, learners get to grips with the process approach to doing Technology. This process will provide the recommended methodology for facilitating learning up to GETC level. Learners must be given many opportunities to develop expertise in the process of identifying problems or needs, developing solutions while investigating and researching, making a solution to meet the problem or need, evaluating the process and the solution in terms of criteria, and communicating the course of action as it proceeded. While they are involved in these activities, learners build up knowledge and skills in utilising tools and materials safely, in planning and presenting, and in co-operating with others as members of teams. As they progress, more sophisticated investigative and reporting techniques are to be encouraged.

Educators must facilitate learner development in a balanced programme targeting all the content included in the Learning Area, namely Systems & Control (including mechanical, electrical/electronic, hydraulic/pneumatic — possibly within the context of manufacturing or service systems), structures (including frame, shell, and solid/mass), and processing (including natural and synthetic materials such as paper, card, wood, metals, plants, textiles, edibles, plastics, etc).

In order to make Technology as relevant and meaningful as possible for a learner, projects and case studies should be set in a variety of different contexts. As technology is a human endeavour, project contexts should be based on:

- *Basic human needs:* food (need to eat and drink), clothing (need for warmth), shelter (need for homes, community), safety (need to keep safe, secure), identity (need for self-identity/belonging),
and
- *Societal needs of nation building and global competitiveness:* project contexts should include: Self-identity/Society, Human Rights, Environment, Information and Industry.

Each of these can provide specific projects for exploration.

Any project context chosen for delivery in a classroom must be realistic and simple to implement. The following examples of possible contexts are offered for consideration. Schools can use some or all of these to shape their learning programmes. They may also use others should they feel that they are more appropriate to their needs or circumstances:

- **Health** — safe workplaces, purifiers, clean water, disabilities, sanitation, clean air, preservation, etc.

- **Manufacturing** — fashion, interior design, production lines, automation, safety, marketing, electronics, services, resources, etc.
- **Media** — desktop publishing, communications, ICT, reporting, presentations, etc.
- **Transport** — land, air, water, space, safety, disabilities, etc.
- **Housing** — shelter, climate, safety, access, habitats, materials, etc.
- **Containerisation** — packaging, storage, materials, etc.
- **Mining** — safety, resource management, machinery, etc.
- **Agriculture** — production, environmental impacts, irrigation systems, feeders, grain storage
- **Sport** — water sport, games, etc.
- **Tourism** — facilities, service delivery, systems, waste management, etc.
- **Energy** — wind, management, renewable/non-renewable, solar, fossil fuels, insulation etc.
- **Recreation** — parks, outdoor activities, nature, etc

2.5 ASSESSMENT IN TECHNOLOGY

2.5.1 Assessment as an Equity Issue

Technology seeks to contribute to a South African goal of equity through education.

Equal access to equal learning opportunities = Equality, if and only if, the assessment procedures are uniform and fair.

The main principles of assessment are: validity, reliability, fairness, transparency and flexibility.

For assessment to be **valid**:

- It must cover the broad range of skills and knowledge needed to demonstrate competency.
- It should be a process that integrates knowledge, skills and values, and with their practical application.
- It should usually be made on evidence gathered on a number of occasions and in a variety of contexts and situations.

For assessment to be **reliable**:

- Assessment practices should be monitored and reviewed to ensure that there is consistency in the interpretation of evidence.

2.5.2 Comparing Assessment Quality

A major challenge for Technology teachers is to arrive at assessment judgements for their own learners that are similar to the judgements that would be made by other teachers, from either the same or different schools. For this purpose the technology Learning Area provides guidance in the form of 'Learning Outcomes' and 'Assessment Standards'. Assessment of these is insignificant in isolation (atomised assessment), and it is the **combination** of these criteria that is indicative of knowledge, skills and attitudes that are actually required.

Assessment in Technology must serve two major purposes:

- As a central element of the learning process — by providing feedback on progress, strengths, weaknesses and the remedies thereafter and

- As a mechanism for ensuring (as far as is practicable) that a certain pre-determined level of achievement has occurred.

The first of these is *formative assessment*, the second, *summative assessment*. Generally, assessment that has been used for formative purposes ought not be used for summative purposes as there has been a lot of direct teacher involvement in the formative process which could distort what we think we know (and report on) in respect of the learner.

2.5.3 Management of Assessment

The purpose of assessment is to make judgements about learners. These judgements are based on having sufficient evidence in respect of the outcome and level being considered. This evidence should come from a number of different assessment methods and should extend over some period of time. The required level of evidence to be met will clearly depend on the importance of the judgement being correct; that is, the level of risk associated with the decision determines how much evidence is required and how rigorous we need to be in validity and reliability of that evidence.

2.5.4 Assessment in Technology

Assessment in technology is more than assessing the individual components. Focussed emphasis on individual Assessment Standards or assessing tasks outside of the context of learning will not lead to a reliable judgement of technological capability. The OBE principle that 'all learners can learn' must foreground our understanding of assessment. In this context the philosophy that underpins assessment is monitoring whether evidence exists and to what degree it does. It follows then that assessment of projects should be done as a whole (process and product) and should be continuous in nature.

For evidence to be produced there needs to be an activity. Such tasks or activities are referred to as assessment activities/tasks. The Assessment Standards or groups of Assessment Standards of the Learning Outcomes should be used to make judgments about learner progress. It must be noted that the Assessment Standard represents the minimum that must be achieved in the grade. Educators are encouraged to have high expectations of their learners.

Formative assessment methods should be dominant during units of work (over time). Feedback is essential during the 'enabling tasks' that give the learner opportunities to develop competence in the capability tasks. An ongoing record should be kept of each learner's performance in the assessment activities associated with each of the Learning Outcomes (Learning Outcomes 1, 2 and 3) and recorded on an on-going basis. Summative assessment, on the other hand, represents a balanced judgment of the learners' achievements at a given time, i.e. at the end of projects.

To make assessment focused, fair and manageable, care needs to be taken in planning learning programs, work schedules and lesson plans, and in the methods and strategies of teaching and assessment. There is a distinct shift in the approach to assessing Technology — which must address practical elements. Note that weighting on the **process** is heavier than on the physical product that is made. When the manufactured product is assessed the focus is both on the

functionality of product and on the making skills involved. Assessment decisions that are made should focus on the quality.

Generic guiding principles of assessing in Technology can be summarized thus:

- The assessment of the capability task (Learning Outcome 1) is primarily of skills i.e. at what level of competency does the learner investigate, design, make, evaluate and communicate.
- The 'enabling' tasks that cover other essential features (found in Learning Outcomes 2 and 3) assess primarily the 'product' of the task or activity.
- Tests should be used to assess specific authentic and relevant knowledge only, as well as specific skills. Tests should only be used in situations where they are relevant. In Technology testing can involve pen and paper tests, as well as practical.

Formulate your assessment to:

- Assess the ability to apply skills.
- Assess the skills themselves in context.
- Assess knowledge through its application in context.
- Assess practical work by observing learners.

2.5.5 The Relationship between Learning Outcomes and Forms of Assessment

Reporting will be done according to Learning Areas (in our case Technology). To be able to report on Technology we will need to record **progress** in the three Learning Outcomes. The Assessment Standards provide a guide to the levels of achievement and are used as a vehicle through which Learning Outcomes are assessed. We use various forms of assessment as stipulated in the National Guideline documents on Assessment in the GET. The table shows the most appropriate relationship between the Learning Outcomes and the forms of assessment.

Form of Assessment	LO1	LO2	LO3
Assignment/Research	I, D, C		✓
Case Study	I	✓	✓
Test	D	✓	
Project	I, D, M, E, C		
Practical Work	M, C	✓	

Key:

- I — investigate
- D — design
- M — make
- E — evaluate
- C — communicate

2.6 OVERCOMING BARRIERS TO TEACHING, LEARNING AND ASSESSMENT

White Paper 6 on Special Needs Education: Building an Inclusive Education and Training System (2001) is built on a new philosophy of education and training. Inclusion addresses the constitutional imperatives of access, redress, equity and quality education for all. With few exceptions, adults have to compete in the same workplace. This new way of thinking makes it very clear that **all** learners need to be taught and assessed **within the same curriculum and assessment framework**. In a nutshell, inclusion is a move away from categorising learners into special groups in order to support them. If learners are studying in different curricula then complex messages are sent about their status in the school and about their status as learners and persons.

Although **all** learners should be able to develop problem solving abilities, and will learn to design appropriate solutions showing some creativity, some learners may have barriers that could hinder the development of specific skills. A physically disabled learner cannot be expected to perform tasks requiring a high degree of manual dexterity. In industry, a designer does not necessarily manufacture the product *s/he* has designed. Allowing alternative strategies to be used can circumvent such barriers. Consequently, alternative and appropriate forms of assessment should be considered for learners with special requirements.

Barriers to learning often result from the misalignment of the four primary factors that make up schooling. These are, the curriculum, the educators, learning environment, and the learners. Each contributes the conditions that determine the successes or failures of the teaching, learning and assessment process. The aspects below look at the salient issues particular to Technology and suggest strategies to address them.

2.6.1 Language of Learning and Teaching (LOLT) and Other Language Issues

Historically and politically, language has been a major factor in making the curriculum inaccessible to many learners. In Technology, irrespective of the medium of instruction, learners should be allowed to discuss issues, (communicate their ideas) in the language of their choice. As learners develop they should become conversant with the Language of Learning and Teaching.

The vast majority of resources are available only in English, a few in Afrikaans and almost none in any of the official African languages. Learners for whom the Language of Learning and Teaching is not English should not be further disadvantaged by being required to translate English references into the language used in their project portfolio.

2.6.2 Capacity of Educators

Whilst educators in South African schools are qualified to teach a variety of subjects, many of the educators of Technology are uncomfortable with the pedagogy of Technology. There is a generally low capacity in terms of the content knowledge, cognitive skills and manual skills for Technology. This, coupled with the low morale of some educators, contributes as a barrier to learning. To build capacity, educators need to begin to understand Technology whilst progressing to knowing how to do technology.

2.6.3 Curriculum

Whilst acknowledging the diversity of the previous education system, cognisance needs to be taken of the philosophies underpinning it. In essence, it sought to channel (on ethnic grounds) the career paths we were to pursue. This has left a legacy of mistrust in curriculum content and a teaching cadre who are struggling to orientate themselves to the transformational ideas of C2005. The RNCS is framed by 'high skills and high knowledge' and needs to be accessible to all learners. Barriers to learning are sometimes a result of inflexibilities of the curriculum.

Resources

One of the factors that inhibit access to the curriculum is resourcing. Schools need to ensure that the necessary resources are available to learners and educators. These resources should be relevant in a South African context, be accessible in language, and be appropriate to the age and level for which it is intended. It is a reality of our society that schools have different levels of resourcing. However, the best-equipped centres do not guarantee the delivery of meaningful Learning Programmes. The most important attribute needed to ensure that the Learning Area is adequately implemented lies in the imagination and dedication of the educator involved. The nature of the Technology Learning Area requires that the educator has a problem-solving personality. Furthermore, s/he must be open-minded and ready to recognise the possibilities of learner suggestions, able to allow learners to develop their ideas. S/he must be prepared to 'learn with the learners.' Educators with minimal levels of equipment have been able to achieve the Learning Outcomes of Technology fully and effectively. Where specific practical work is required the lack of appropriate resources can contribute to a lack of learning. Schools should strive to improve their facilities over time, but should never make their poor facilities or equipment an excuse for their failure to develop the learners' abilities to solve problems or address needs in a range of contexts, while considering issues of safety, bias and culture. If resources are available, the educators must be empowered to use them effectively so that learning can take place.

In addition, the Learning Area provides educators with ideal opportunities to develop and assess a range of group dynamic experiences. Learners also will be required to manage resources like time, materials, fellow learners, tools and equipment. As learners progress through the GET Band, critical and creative thinking skills should evolve, and their skills at presenting their research findings and solutions should become more sophisticated.

Terminology

The correct use of terminology and standard conventions is encouraged. This is especially relevant to public schools that should use the SABS standards and conventions. Where sign is the main language, the specifics relating to language and terminology use must be acknowledged. Learning sites using textbooks and references published in foreign countries are advised to exercise caution as these typically use terminology and conventions based on European or American standards. Whilst some of these standards and conventions may be international, many of them do not fall within the SABS.

Socio economics and social stereotypes

South Africa needs to develop its skills-base in the realm of technological careers. The employment opportunities and national economic needs in the manufacturing and industrial sectors far exceed those of academic professions. Our unskilled labour market is over-supplied and we must expand the training of technologically oriented workers. As a developing nation, the only way we can achieve growth in the gross domestic product (GDP) of the country is by increasing the number of primary and secondary producers. Hence, the nation needs more learners to enter this vital sector of the economy. Historically, girls have tended to shy away from the scientific and technical sectors. Pressure from society mitigated against involvement of girls in what was perceived as a 'man's world.' Certain cultural and racial groupings have also historically been discouraged from gaining access to technical careers. Learners experiencing 'barriers to learning' are also those who have been stereotyped as unable to achieve anything but practical skills.

2.6.4 Intrinsic Barriers to Learning (Disabilities within the Learners)

Our system of education has not been fully successful in dealing with learners experiencing difficulties in learning. Our socialisation makes us believe that these learners are found in 'special' schools, but the stark reality is that most learners with special needs are in mainstream classrooms. Adaptations to the methods and techniques of instruction **and** assessment need to be made to accommodate the diversity of learners. This needs to be seen in the context of an integrated and inclusive education system that is based on equity, access and redress. Barriers range from lack of resources to one or more of the following factors: social, physical, and mental challenges. Given that there is no special world out there, all learners must work on the same Learning Outcomes and Assessment Standards. However, the way in which their capabilities are assessed may vary. For Technology the following is suggested:

- **More time** — It is recommended that in specific cases, in consultation with the District Support Team, more time may be allowed for the completion of units of work. This may imply that fewer full projects have to be completed — a project may be replaced by a shorter structured task targeting specific Assessment Standards.
- **Language of choice** — Learners will need to provide oral or written evidence from time to time. In cases where the Language of Learning and Teaching is not the mother tongue of the learner, provision must be made for the learner to respond in a language of choice. This is also to be applied where sign is the language of the learner. This will bring with it challenges and a mechanism to verify the responses needs to be put in place.
- **Alternative to 'making' tasks (manual competency)** — where no alternative strategy to assessing manual competency is available, learners with physical disabilities may be required to demonstrate competency in an alternative manner. This needs to be considered only in appropriate circumstances. Safety issues are a major consideration; another is the self-esteem of the learners.
- **Visually impaired** learners may not be able to fulfil all the requirements of certain tasks in technology. In such cases the specific abilities of the learner need to be ascertained and an appropriate assessment strategy be put in place. In many cases these learners will be able to do certain practical tasks. These learners should get more time.

In certain cases an amanuensis (assistant) may be used. Such assistants could perform a variety of functions, i.e. interpreter (in the case of sign language) of questions, briefs or instructions; perform practical tasks; as a scribe to write on behalf of the learner; to express orally or in sign language the learner's thinking; etc. Other considerations may be on how assessment evidence can be presented (audio, video, etc).

To make the curriculum accessible to learners with severe barriers certain aids may be necessary. These could include, audiotapes, overhead projectors, dictaphones, video recorders, sign charts, computers, typewriters, braille typewriters, etc.

Learners who progress at a slow rate need to be accommodated. Such learners are found in many mainstream classes. Whilst most traditional methods of assessment could be applied, the teaching strategies need to be adapted to allow the learner to reach his/her maximum potential.

2.7 DEVELOPING A LESSON PLAN FOR TECHNOLOGY

A lesson plan in Technology is a complete, coherent series of teaching, learning and assessment tasks that make up a strategy guiding learners as they progress, improving their abilities in problem solving, investigating, designing and developing solutions, and evaluating and communicating them in a range of contexts.

Technology suggests two distinct delivery models viz.:

Using Technology Projects: A Technology project can be used to develop all of the Assessment Standards for Learning Outcome 1, one particular knowledge area of Learning Outcome 2, and some Assessment Standards from Learning Outcome 3. This model could be used to develop all of the Learning Outcomes, and allows for the possibility of attempting different content areas from Learning Outcome 2. This model also recognises the possibility that knowledge areas can be integrated, i.e. The Structures and Processing Assessment Standards of Learning Outcome 2 can both be covered within a construction project, Electrical and Mechanical systems can both be dealt with during an automation project.

Using Case Studies: Specific tasks can be used to, both develop and assess any technological skill (drawing for example), knowledge concepts, and attitudes/values. In this model, for example, a case study task could be set to develop some of the investigation Assessment Standards and some of the evaluation Assessment Standards of Learning Outcome 1, and all of the technology, society and the environment Assessment Standards of Learning Outcome 3.

Examples of these models are shown in section 5 and 6.

The technological processes and skills described in Learning Outcome 1 form the backbone of the Learning Area and should be used to structure the delivery of all the Learning Outcomes Teachers should expose learners to problems, needs or opportunities as a starting point. They should then **facilitate the learners** as learners engage in the systematic development of solutions that solve problems or satisfy needs. The effectiveness of designs must be evaluated. As explained, Learning Outcome 1 carries 50% of the weighting emphasis in Technology.

A variety of assessment strategies should be utilised. These must be planned for while developing the Learning Programme and associated with work schedule, and should be an integral part of the lesson plan. A lesson plan in Technology is a strategy intended to develop a learner's skills, and will naturally take a number of weeks to complete. The major projects can be supplemented with shorter units targeting specific skills-development or knowledge-foci not otherwise adequately covered. This approach allows for the use of expanded opportunities targeting learners who have performed either below or above the expectations for that level.

Learning Outcome 2 provides learners with the range of knowledge contexts that **must** be used to develop relevant Learning Programmes. Every grade will deal with Structures, Processing, and Systems and Control at levels of complexity appropriate to the grade. The Assessment Standards provide a guide to the levels that learners are expected to accomplish. The specific aspect under investigation should be carefully selected so that the issues are meaningful and relevant to the learners in a particular school.

As their abilities develop, learners should be challenged to deal with wider and wider perspectives. Where possible, learners should engage in projects that **integrate** Processing, Structures and Systems & Control.

Learning Outcome 3 will usually be integrated within the contexts of Learning Outcome 2.

Learners should consider the impact of technological solutions on society and on the natural environment as they develop their solutions. They should also consider the influence of culture and indigenous technologies on the choices made by people. When problems or needs are addressed, it is important to consider the most appropriate solution in terms of the available resources and the circumstances of the people involved. Learners should be able to consider the needs of, and accessibility to, other groups as they address problems facing various sectors of society. The safe use of tools and equipment, and the safety features of a design, must be important criteria dominating both teaching, learning and assessment in the Learning Area.

In addition to the decisions taken with respect to Learning Outcomes, Assessment Standards, time allocation and applicable teaching, learning and assessment context(s) during the design stages of the Learning Programme and work schedule, the educator must now consider...

- A meaningful context
- Sourcing and/or developing teaching and learning activities
- The integration of skills where applicable
- Assessment strategies and instruments to be used

When these issues have been considered, the educator is finally ready to develop the lesson plan.

Detailed is all about the sequencing and pitch of the teaching, learning and assessment activities, within the Technology Learning Area. In the execution of a lesson plan the educator will become aware of issues that may not have been anticipated. Learners may develop solutions never considered by the educator. Such originality should not be stifled, but will need to be incorporated and may, in turn, be considered when planning the next unit(s) of work. Like Learning Programme development, lesson plan is not a linear process but rather one of continual modification, reflection, revision and refinement.



SECTION 3

INTERMEDIATE PHASE

3.1 THE INTERMEDIATE PHASE LEARNER

The Intermediate Phase is important in that it provides for a specific group of learners in the approximate age group 8-14 in grades 4-6. In this phase, learners are:

- Becoming more sensitive to how their actions affect others;
- Beginning to consider the needs, desires and points of view of others;
- Able to function co-operatively in the completion of group tasks with increasing ease;
- Enjoying the challenge of tackling independent tasks;
- Beginning to reveal the desire to take control of their own learning;
- Attempting to satisfy their curiosity about the world around them through active participation and critical enquiry in the learning process;
- Beginning to seek more order; while still manifesting spontaneity and creativity;
- Becoming more deliberate and methodical in their approach;
- Increasingly able to apply acquired methods in new contexts;
- Increasingly able to access, record and manipulate information; and
- Increasingly able to investigate, compare and assess critically.

3.1.1 The Intermediate Learner in Technology

In this Phase, learners get to grips with the Design Process. This process will provide a methodology for facilitating learning up to GETC level. Learners must be given many opportunities to develop expertise in the process of problem or needs identification, developing solutions while investigating and researching, making a solution to meet the need or problem, evaluating the process and the solution in terms of criteria, and communicating the course of action as it proceeded. While they are involved in these activities, learners build up knowledge and skills in utilising tools and materials safely, in planning and presenting, and in co-operating with others as members of teams. Educators must facilitate learner development in a balanced programme targeting all the content included in the Learning Area, namely Systems & Control (including mechanical, electrical, hydraulic/pneumatic within real-life contexts like manufacturing and service systems), structures (including frame, shell, and solid/mass), and processing (including food, textiles, and materials like card, wood, metals and plastics).

3.2 LEARNING PROGRAMME OPTIONS IN THE INTERMEDIATE PHASE

This section provides guidelines for the development of Learning Programmes in the Intermediate Phase. Three options on how to develop a Learning Programme are discussed in this section. When designing a Learning Programme, Work Schedule or Learning Unit, it is important to remember that assessment tasks and the recording of learner performance are planned together as part of the activities being developed.

Even though guidelines are provided by the Department of Education at a national level, provinces will

develop further guidelines where necessary in order to accommodate diversity. Schools could propose the number and nature of the integrated Learning Programmes based on their own school contexts. These integrated Learning Programmes must ensure that the prescribed Learning Outcomes for each Learning Area are dealt with effectively and comprehensively.

The purpose of developing integrated Learning Programmes is to address the following:

- Even though there are eight Learning Areas, with their own knowledge domains, it is important to remember that knowledge does not exist in isolation. There are natural connections between and across Learning Areas, and knowledge in one Learning Area is relevant and can be used to achieve Learning Outcomes in another Learning Area.
- When planning, it is useful to consider using the Learning Outcomes in one Learning Area to enrich another Learning Area. The linkage though should reflect a natural connectedness, and should not be a forced link for the sake of linking with another Learning Area.
- Using the option for integration, allows for effective management of available staff and issues of overload in the diverse school contexts that exist. At Intermediate Phase, it may be that the following situations prevail:
 - 1 teacher is responsible for teaching all Learning Areas in a grade
 - 1 teacher is responsible for teaching more than one Learning Area in different grades
 - 1 teacher teaches across Learning Areas and across grades(There may be other arrangements in different schools.)

The options presented are meant to address these situations especially as teachers will develop the Learning Programmes themselves.

It is understood that eight Learning Areas MUST be implemented in the Intermediate Phase. Also Languages and Mathematics will be distinct Learning Programmes. This is important for reporting and recording purposes. Irrespective of how Learning Areas are integrated, reporting is done against the Learning Outcomes of each of the Learning Areas. Teachers will record learner performance against the Learning Outcomes and Assessment Standards selected for developing an activity.

3.2.1 What the Integration of Learning Areas means

Integrating Learning Areas should enhance the knowledge, skills, attitude and values embedded in the Outcomes Learning of each Learning Area. Learning Outcomes have been translated into the Assessment Standards relevant to each grade and although planning starts with Learning Outcomes, it is how Assessment Standards are integrated that is important. Some Assessment Standards can stand alone while others may be clustered with Assessment Standards from other Learning Areas.

The Learning Area content, concepts or themes are NOT the starting point when planning integration. However, they are important vehicles for achieving the Learning Outcomes and are to be considered as part of the planning. Each Learning Area has its own concepts and knowledge domain, but achieving knowledge on its own without developing appropriate skills is not what we strive for in an Learning Outcomes-based curriculum.

The integration of Learning Areas into Learning Programmes will have implications for planning.

3.2.2 Implications for Planning

When planning it is important to take into consideration:

- How well the teacher knows the other Learning Areas in order to be able to integrate and assess effectively
- The integrity of the Learning Areas must be maintained and learning in each Learning Area must not be compromised
- Coverage of all Learning Outcomes and Assessment Standards in each Learning Area must be ensured.
- That the planning for assessment is done as part of the planning for activities. This is important when integrating across Learning Areas as well as when integrating within a Learning Area. It is also important for avoiding overload in teaching and learning, and teachers feeling that they are doing ‘too much’ assessment.
- That the planning needs to involve all teachers at school and/or at a grade level
- That the time utilization must be in line with national policy
- Different approaches to teaching and learning can be used to support classroom practice. For example, the investigative and practical approach to teaching Natural Sciences will best suit the Learning Outcomes
- That the effective use of available resources must be planned, and that resources that are not available but needed earning Learning Outcomes. must be identified and provided.

3.2.3 Options to be Considered

The following options are suggested for integrating (or combining) Learning Areas into Learning Programmes, remembering that Languages and Mathematics are distinct Learning Programmes. Planning an integrated Learning Programme always starts with identifying and combining the relevant Learning Outcomes of those Learning Areas being integrated. Even when planning from a Learning Programme to a Learning Unit, teachers start with integrating the Learning Outcomes and Assessment Standards.

Option 1: Learning Programmes are derived directly from Learning Areas.

This implies that the Learning Areas themselves are the Learning Programmes.

This does not mean there are not opportunities within the Learning Programme to integrate, especially if it is to enrich teaching and learning. In this option teachers may want to cluster Learning Outcomes and Assessment Standards *within* the Learning Area.

Teachers assess learner performance in line with the Assessment Standards and report against the Learning Outcomes.

Option 2: One Learning Area is integrated with another Learning Area.

For example:

- Natural Sciences and Technology, or
- Economics Management Sciences and Technology, or

- Economics Management Sciences and Social Sciences, or
- Life Orientation and Arts & Culture, or any other combination of Learning Areas.

In this option, match the Learning Outcomes of both Learning Areas, and cluster the appropriate Assessment Standards. There are instances within an integrated Learning Programme where some Learning Outcomes can be dealt with separately.

Teachers are **NOT** to write *new* Learning Outcomes or new Assessment Standards.

They assess against **the clusters** of Assessment Standards and record against these Assessment Standards as defined in the activity or task. They report against Learning Outcomes.

Option 3: Short term integration with other Learning Areas.

In this option there is short-term integration across Learning Areas for enrichment where natural connections with other Learning Outcomes and Assessment Standards are established

For example:

- Life Orientation with SS and A&C
- EMS with TECH and Life Orientation
- NS with SS (Geography)
- Tech with A&C

(Or any other combinations)

Teachers assess and record against the Learning Outcomes and Assessment Standards of each of the Learning Areas that have been integrated. Reporting is done against the Learning Outcomes. The illustrations that follow provide examples of how these options are planned in the different Learning Areas.

3.3 ILLUSTRATION OF A LEARNING PROGRAMME

3.3.1 Illustration of a Technology Learning Programme, Option 1

The Intermediate Phase Grade 6 learner in Technology Learning Area

In this Phase, learners get to grips with the Design Process . This process will provide a methodology for facilitating learning in the GETC level. Learners must be given many opportunities to develop expertise in the process of problem or needs identification, developing solution while investigating and researching, making a solution to meet the need or problem, evaluating and the process and the solution in terms of criteria, and communicating the course of action and proceeded. While they are involved in these planning and presenting, and in co-operating with others as members of teams, teachers must facilitate learner development in a balanced programme targeting all the contents.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Grade 4	LO1 - LO2 - LO3 - Context - Case Study 1 Context - Case study 2													LO1 - I, D, M, E, C LO2 - Systems & Control- Mechanical LO3 - Impacts Context - Media LO1 - I, D, M, E, C LO2 - Processing LO3 - Impacts Context - Sport													LO1 - LO2 - Structures LO3 - Context -													

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Grade 5	LO1 - I, C LO2 - LO3 - Biases & Indigenous Technology Context - Media Case Study 1 Context - Manufacturing Case study 2													LO1 - LO2 - Processing LO3 - Context - LO1													LO1 - LO2 - Systems & Control - Mechanical LO3 - Context -													

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Grade 6	LO1 - D, M, E, C LO2 - Structure and processing LO3 - Biases & Indigenous Technology Context - Health LO1 - I, M, C LO2 - Systems & Control-Hydraulic LO3 - Impacts Context - Safety Case Study 1 Context - Manufacturing Case study 2													LO1 - I, D, M, E, C LO2 - Systems & Control-Electrical LO3 - Context - Impacts, Biases & Indigenous Technology													Context - Mining LO1 - I, D, M, E, C LO2 - Processing LO3 - Indigenous Technology Context - Tourism													

3.3.2 Illustration of a Technology and Natural Sciences Learning Programme, Option 2

In this Phase, learners get to grips with the Design Process. This process will provide a methodology for facilitating learning in the GETC level. Learners must be given many opportunities to develop expertise in the process of problem or needs identification, developing solution while investigating and researching, making a solution to meet the need or problem, evaluating and the process and the solution in terms of criteria, and communicating the course of action and proceeded. While they are involved in these planning and presenting, and in co-operating with others as members of teams, teachers must facilitate learner development in a balanced programme targeting all the contents.

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Grade 4	Tech LO1 - Investigate NS LO1 - Conduct investigation and collect data; explores the possibilities in available materials findings out how they can be used Safety: The farming community in the Gagame village usually lose their sheep, cows and goats through road accidents													NS LO2 - recalls meaningful information Tech LO1 - Write or communicate with assistance, a short clear statement for the development of a products													Tech LO1 - Makes, Evaluate and Communicate													

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Grade 5	Tech LO1 - Investigate NS LO1 - Investigate Tech LO3 - Indigenous Technology and Culture NS LO - Understand Science and Technology in the context of history and indigenous Context : Materials and Processing													NS LO3- understand the impact of Technology and Science , identifies positive and negative effects of Scientific Development Tech LO1 - Design Tech LO1- Suggest and record solutions Tech LO2 - Processing NS LO2 - Recalls meaningful information													Tech LO2- Systems and Control NS LO2- Matches mechanical Systems to the definitions of their motions													

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Grade 6	Tech LO1 - I, C Tech LO3 - Impact of Technology and Biases in Technology Natural Science LOI - evaluate data and communicate findings Natural Science - LO2 Recalls meaningful Information Context: Manufacturing of paper/plastic /shoe and their utilisation													Tech LO2 - Structures, Processing Tech LO3 - Indigenous Technology NS LO3 - understand the impact of Science and Technology. Suggest how Technological products can be improved													Tech LO1 - Design Tech LO1 - Make													

3.4 ILLUSTRATIONS OF WORK SCHEDULES

3.4.1 Illustration of a Grade 6 Work Schedule for Technology

Drawn from the Intermediate Phase Technology Learning Program below is an example of a work schedule. In essence the work schedule is a more detailed expansion of the overall plan for a given period of time. Please note that we did not show all the integration with other Learning Areas. The teachers could integrate any number of Learning Areas.

Grade 6 Technology Work Schedule**Year: 2003****Teaching time available (%/ Hours): Hours: Weeks: 2****Learners' needs:****Generic:** Alternative methods of Assessment that accommodates various types of learners

Week	1	2	3	17	37	38	39	40
Grade 6	<p>LO1 - I, D, M, E, C LO2 - Processing LO3 - Indigenous</p> <p>TechnologyInvestigate how the existence of mining could impact on the natural resources and physical environmentInvestigate how mining influence the life of the community with special emphasis on ; gender. human rights, race and economy</p> <p>Integration: HSS,NS,LO Context: mining. Form of assessment: Research Resources: electronic and print media Library materialElderly people in the community</p>	<p>LO1 - I, D, M, E, C LO2 - Processing LO3 - Indigenous</p> <p>TechnologyInvestigate the career path one could pursue when working on the mines.Investigate on the kinds and nature of disease that are mostly caused by mining industry</p> <p>Integration: EMS,LO,HSS Context: career path Form of assessment: Research Resource: electronic and print media Library materialElderly people in the community</p>						

3.4.2 Illustration of a Grade 6 Work Schedule for Technology and Science

Drawn from the Intermediate Phase Technology and Science Learning Program below is an example of a work schedule. In essence the work schedule is a more detailed expansion of the overall plan for a given period of time. Please note that we did not show all the integration with other Learning Areas. The teachers could integrate any number of Learning Areas.

Grade 6 Technology and Science Work Schedule**Year: 2003****Teaching time available (%/ Hours): Hours: Weeks: 2****Learners' needs:****Generic:** Alternative methods of Assessment that accommodates various types of learners

Week	1	2	3	17	37	38	39	40
Grade 6	Tech LO 1 - I,C Tech LO 3 - Impact of Technology and Biases Natural Science LO 2 - Recalls meaning NS LO1 Investigate how products such as shoes, plastic or paper are manufacturing Context: manufacturing	NS LO 3 - understand the impact of Science and Technology Suggest the ways to improve Technology products. Tech LO 3 - Processing						

3.5 ILLUSTRATIONS OF LESSON PLANS

3.5.1 Illustration of an Intermediate Phase Science and Technology Lesson Plan

LESSON PLAN		
Learning Areas: Science and Technology		Grade:
Duration:		Date/Week:
Learning Outcome: Tech LO 1 — Investigate NS LO 2 — Conduct investigation and collect data Conduct simple test or survey Evaluate data and communicate findings	Assessment Standards:	Integration: Environment Mathematics HSS NS LO
Looking backward at: Research and critical analytical skills		Looking forward to: The ability to look for products that are qualitative and durable
Context: Manufacturing		
Assessment activities: Submission of findings by the learners Developing a questionnaire to collect data Learners do oral presentation Learners display a variety of research products found in newspapers and media		
Forms of assessment: Research		Resources: electronic media, print media, human resources
Expanded opportunities: Design a better product Better knowledge of diverse culture Creating a conducive environment for teaching and learning Better understanding of learners by educators Mutual interaction with learning material		Teacher reflection: How best did learning and teaching take place What is the level of learners research skills How well did my learning program prepare learners towards the achievement of the desired outcomes What should be strengthened and how should it be strengthened Was the proper link between previous task and present task

3.5.2 Illustration of an Intermediate Phase Technology Lesson Plan

LESSON PLAN	
Learning Area: Technology	Grade:
Duration:	Date/Week:
Learning Outcome: Tech LO1 — Communicate or write a design brief NS LO2 — Develop Tech LO2 — Systems and Control Tech LO3 — Indigenous knowledge	Integration: Environment Mathematics HSS NS LO
Looking backward at: Research and critical analytical skills	Looking forward to: The ability to relate to the impact of the Technology in various situations. The ability to differentiate the various career path in the field of mining
Context: Mining Context: career path	
Assessment activities: Submission of findings by the learners Developing a questionnaire to collect data Learners do oral presentation Learners display a variety of research products found in newspapers and media	
Forms of assessment: Research	Resources: electronic media, print media, human resources, field trips
Expanded opportunities: Explore various fields of study Interacting with the world of work Exploring in different fields Motivation through interaction	Teacher reflection: How best did learning and teaching take place What is the level of learners research skills How well did my learning program prepare learners towards the achievement of the desired outcomes What should be strengthened and how should it be strengthened Was the proper link between previous task and present task

SECTION 4

SENIOR PHASE

4.1 THE SENIOR PHASE LEARNER

In this phase, Technology will be developed as an extension of the ground laid previously, and as preparations for the Technical and Engineering fields available during the FET . The design process still underpins the methodology as learners advance their skills of problem or needs identifications, developing solutions while making research and investigations making a solutions to meet the need or problem, evaluating, the prices and the solutions in terms of criteria, and communicating the course of action as it proceeded. At this level, more sophisticated investigative and reporting technique , including adherence to South Africans conventions, will be expected. More advanced tools, including some machine tools, will be available to learners in grade 8 and 9 during this phase . Technology educators should facilitate cooperation's teamwork in a balanced program in program, targeting all content included in the Learning Areas.

4.2 ILLUSTRATION OF A LEARNING PROGRAMME

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	Grade 7 LO 1 - (Assessment Standards) I,D,M,E,C LO2 - Assessment Standards Systems and control (mechanical systems) LO 3 - Assessment Standards Biases in Technology and impact of Technology Context - Recreation													Grade 8 LO 1 - I, C LO - Systems and Control (pneumatic systems) LO - Indigenous Technology and Culture, impact of Technology and Biases in Technology Context - Building of structures													Grade 9 LO 1 - I,D,M,E,C LO 2 - Systems and control (electrical) LO 3 - Impact, biases and indigenous Technology Context - Agriculture													

4.3 ILLUSTRATION OF A WORK SCHEDULE

4.3.1 Illustration of a Grade 9 Work Schedule

Drawn from the senior Learning Program below is an example of a work schedule. In essence the work schedule is a more detailed expansion of the overall plan for a given period of time. Please note that we did not show all the integration with other Learning Areas. The teachers could integrate any number of Learning Areas.

Grade 9 Technology Work Schedule

Year: 2003

Teaching time available (%/ Hours): Hours: 4

Weeks: 2

Learners' needs:

Generic: Alternative methods of Assessment that accommodates various types of learners

Week	1	2	3	17	37	38	39	40
Grade 7	LO 1 - Investigate how electricity was generated in the past Investigate what electricity was used for in the past. Compare the present system of generating electricity with the traditional way of generating electricity Integration : HSS,NS,LO Context: The generation and use of electricity for house hold and agricultural purposes Form of assessment: Research Resources: electronic and print media Library material Elderly people in the community	Tech LO 3 - Research on who were the main users of Technology in your community						

4.4 ILLUSTRATION OF A LESSON PLAN

An example of a Lesson Plan is shown covering the learning, teaching, and assessment activities, assessment forms, content/context etc., in the Senior Phase.

The exemplars variously illustrate i) activities based on one Learning Outcome with one or more Assessments Standards; ii) activities based on integrating more than one Learning Outcome and related Assessments Standards within the Learning Area; iii) activities integrating Learning Outcomes and related Assessments Standards across one or more Learning Areas.

This exemplar shows the activities based on integrating more than one Learning Outcome and related Assessment Standard within Technology and is based on Grade 9.

LESSON PLAN	
Learning Area: Technology	Grade: 9
Duration: 2 weeks	Date/Week: Weeks 1 - 2
Technology LO 1:. What is the impact of the use of electricity in our communities	LO 2 Draw a circuit diagram indicating parallel flow of electricity
Looking backward at: The use of pneumatic system to generate power Building of electrical circuit	Looking forward to: What electricity is used for i.e. agriculture and more
Core knowledge: systems and control, structures, communications	
Content/ Context: The availability and the lack thereof of electricity How electricity benefit communities Building of electricity structure	
Learning activities and assessment: <ul style="list-style-type: none"> • In order to enhance learning , learners with the guidance of teachers visit places where electricity is generated • Learners develop questionnaire to be used when such visits are taking place • Learners discuss as a group how they could develop electricity circuit • Learners exploit the possibilities of how traditional ways of generating electricity could be merge with the modern way of generating electricity • Learners discuss ways of improving the ways of generating electricity • Explore ideas on how the availability power could open up business opportunity 	
Forms of assessment Research Test Assignment Case study	Resources: <ul style="list-style-type: none"> • Businesses • Textbooks • Printed media • Sources of information • People

Expanded opportunities: <ul style="list-style-type: none">• Analysis of a case study• More visits to businesses• Research on types of business	Teacher reflection: <ul style="list-style-type: none">• Were the Assessment Standards for this Lesson Plan met?• Were the learners able to complete the activities listed above?• Did the learners deliver proof of learning, i.e. written task, oral?• Was remediation supplied to those learners who required it so that all could achieve the Assessment Standards for the Lesson Plan?• What must be done to improve presentation in the next Lesson Plan?• What information needs to be carried through, i.e. repeated in a different manner to improve learner understanding?• Did the LP achieve what it intended to achieve• How should the LP be improved• What are the strength and weaknesses of the LP
---	---

SECTION 5

LEARNING AND TEACHING SUPPORT MATERIALS (LTSMs)

Learning and Teaching Support Materials have a very important role to play in the learning of Technology. They provide the medium through which teaching and learning happens at school. Without any form of Learning and Teaching Support Materials in the classroom, not much learning can take place. Among other things, they provide opportunities for learners and educators to:

- Develop skills, knowledge, values and attitudes as underpinned by Learning Outcomes and their corresponding Assessment Standards in the Technology Learning Area Statement.
- Work with tools and materials to develop solutions to identified problems.
- Do research in various areas of Technology.
- Contextually learning activities in Technology thereby relating what is learned in the classroom with the outside world.

Learning and Teaching Support Materials in Technology include...

- Tools — for working with various materials.
- Materials — i.e. cardboard, paper, wood, plastic, textile, food, metal, etc.
- Reference Materials — i.e. textbooks, encyclopaedia, electronic reference media, Internet, Discovery Channel, etc.

Resourcing varies dramatically from school to school in terms of amenities and equipment. In spite of this reality, there need not be significant differences in successful curriculum delivery. Under a wide range of circumstances, imaginative educators can provide effective teaching and meaningful learning programmes irrespective of the quantity or quality of Learning and Teaching Support Materials they have. Schools, even with minimal facilities, can provide learners with opportunities to develop their problem solving and design skills using simple tools with materials like corrugated cardboard. Learners can develop skills using models and simulations without much expense. The creative use of discarded and recyclable materials is to be encouraged. Minimal resources often encourage greater levels of creativity leading to original design solutions and better learning.

Over a period of time all schools should build up their supply of tools, materials, and references so that they can tackle new projects. Learning Programmes should evolve to match the growing resource base of the school.

Evaluating and selecting Learning and Teaching Support Materials

The technology teacher should avoid support materials that give solutions to learners because such materials do not encourage learners to think independently. The aim is that learners should innovate, invent and use their knowledge to design technological solutions, not to copy pre-designed ones from books. It is acceptable for support materials to spell out step-by-step procedures or processes of how to develop a solution for a particular problem but after learners have gone through those steps, they must be given a new opportunity of demonstrating the newly acquired skills. Support materials should in general under-pin OBE principles and must deal with social and ethical issues about technology.

All resources like tools, machines, materials, role models, and other teachers with specialised skills should be used optimally. The sophistication of materials and tools used by learners should correspond to their cognitive level. It is a duty of the technology educator to ensure that appropriate tools and equipment is obtained and that learners use them safely and take necessary care thereof.

The following are guidelines to evaluating and selecting Learning and Teaching Support Materials:

- *Learner centeredness:*
Technology activities should be learner centred and should allow less room for teacher performance. They must be written as activities for the learner or groups of learners to do, i.e. draw graphs, complete worksheets, make a model, develop a poster, complete a table, answer a list of questions, discuss a topic, research a topic and prepare a speech, etc. Activities should also cater for different learning styles. They should have different types of tasks, some oral, some written, some graphical, some practical, some requiring abstract conceptualisation and others requiring concrete experiences.
- *Cooperative learning:*
Co-operative learning is about learners learning from each other rather than all information coming from the teacher. Learners who are taught to learn cooperatively should also be able to work together as members of a team (See Critical Learning Outcomes). Activities found in the Learning and Teaching Support Materials should therefore be structured in such a way that they create opportunities for Cooperative Learning.
- *Learning Outcomes:*
An outcome is what learners should be **capable of doing** at the end of a learning experience. Technology Learning and Teaching Support Materials should afford learners opportunities to prove their capability in each Learning Outcome. They should have activities that are based on Learning Outcomes and their corresponding Assessment Standards in order to develop certain Technological skills, knowledge, values and attitudes.
- *Appropriateness of learner activities to learners' cognitive development:*
Typically, classes in South African schools will be 'multi-level' as not all learners will be at the same developmental and cognitive level. Even an individual learner may exhibit a range of abilities from one Learning Area to another. There must be adequate activities that focus on learners' prior knowledge and/or skills so that they are motivated to tackle upcoming activities that provide challenges. 'Success breeds success'—learners should, therefore, have a measure of success in the process of learning, regardless of the final level they achieve.
- *Contextualisation of activities:*
Learning and Teaching Support Materials need activities that are set in contexts that are familiar to learners. This should be particularly easy to do in Technology since almost all activities are 'kick-started' by a situation that requires a 'real-life' problem to be solved. Contexts give a purpose to learning activities and they help learners to relate what they learn in classroom with the outside world.
- *Assessment guidelines:*
Learning and Teaching Support Materials need to guide educators on how certain activities in the Technology Learning Area are assessed. Learners need to produce clear evidence of having achieved

the Learning Outcomes that were set upfront. Activities in the Technology Learning and Teaching Support Materials should be written in such a way that it is clear to learners both what is expected of them and also the level at which they need to perform. It is important to allow learners to achieve in the way that suits them best as they have different learning styles. Technology Learning and Teaching Support Materials have to take this into consideration.

- *Affordability:*

Technology activities in the Learning and Teaching Support Materials should reflect the socio-economic situation in various South African communities and, therefore, the resource limitations in many classrooms. For example, it will not be sensible for authors to write learner activities that depend on the availability of computers or other 'high-tech' equipment in schools. Activities found in Technology Learning and Teaching Support Materials must not only be do-able but must also be implementable in the average South African classroom.

Materials developed over-seas may be less desirable for the following reasons:

- They are not written for our Learning Outcomes and Assessment Standards.
- They do not use local contexts and are thus less accessible to local learners.
- They are not written in terms of our SABS Conventions.
- They are not written for Transformational OBE and hence do not target attitudes and values in the required manner.
- **The currency exchange rate makes them expensive and consumes foreign exchange.**





