

Inservice Units to Support the Implementation of the
Primary Reform Curriculum

**Unit 4:
Learning Areas: Mathematics
and Science**

Unit Summary

Unit Summary

Congratulations! You have completed this unit.

At this point, let us review your learning journey.

You may have studied the unit during school-based, cluster or district learning and development (in-service) for self-improvement or improving your qualifications.

If you were seeking academic credit, you commenced your learning by completing the *self-assessment*. Then you went on to negotiate your *Learning Contract*. You may or may not have gained any recognition of prior learning for your experience or previous study.

The modules within the unit are:

Module 1: Introducing the Mathematics and Science Learning Areas

Module 2: Learning outcomes, indicators and elaborations

Module 3: Teaching and Learning, Assessing and Reporting

Module 4: Applying your learning – developing units of work

In these modules you explored the links between the two Mathematics syllabuses and the two Science syllabuses (lower primary Environmental Studies and upper primary Science) and their respective teacher guides. You have also made links across the two learning areas. This will assist you in your planning, especially for integrated learning. You also explored how to use information from the syllabuses and teacher guides about outcomes, indicators and elaborations to design units of work.

During this unit, you explored two significant policy documents – the *National Curriculum Statement (2002)* and the *National Assessment and Reporting Policy 2003*, and the concept of outcomes-based education (OBE) in relation to the Mathematics and Science learning areas.

The focus throughout the unit required you to learn, do, share and reflect in the context of your work situation.

At this point let us review your progress. One way of doing this is by assessing the extent to which you can now demonstrate each outcome.

The outcomes for the unit are copied here. If you gained RPL for some of the outcomes, put a ‘tick’ in the right hand box in the table below for those outcomes.

For the other outcomes how do you assess yourself - Yes, No or Not sure?

Can you:	Yes/No/ Not sure
1. describe the structure and contents of the syllabuses and teacher guides in the Mathematics and Science learning areas?	
2. identify links between the syllabuses and the corresponding teacher guides?	
3. make connections between the Mathematics and Science learning areas?	
4. describe and discuss ways progress from grade 3 to grade 8 is described in the mathematics and science learning areas?	
5. use the syllabuses and teacher guides to construct units of work based on learning outcomes?	
6. make links between the syllabuses and teacher guides and the <i>National Curriculum Statement (2002)</i> and the <i>National Assessment and Reporting Policy, 2003</i> ?	
7. assist others to understand and use these primary syllabuses and teacher guides?	

If you answered 'yes' to all of them, then you have done very well. If you are seeking academic credit, think about the kinds of evidence which will support the achievement of each of the outcomes.

If you have said 'no' or 'not sure' to some, then it may be worth your while to go over the appropriate sections of the module again and have another go at repeating the tasks, and/or reflecting on your difficulties and seeking help.

A second way of assessing your progress is by completing the *self-assessment* in the *Accreditation and Certification* section again. Use a different coloured pen to place a tick on each continuum to show what you know now.

Compare your assessment of your own knowledge and skills before and after you completed this unit.

- Where have you shown the most growth?
- In which areas might you need to consolidate your learning or seek further assistance?
- Are there other areas that have now become apparent as learning priorities for you?

If you are seeking academic credit and you are satisfied that you are ready for assessment, go to your assessor and start the processes of assessment. The demonstration of the negotiated unit outcomes through this Study Guide and any other negotiated materials form the basis for assessment.

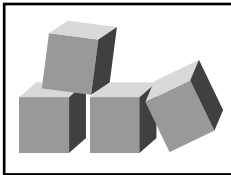
If you have been studying on your own or with a colleague, then you may wish to consider enrolling with PNGEI for external assessment. Information regarding this is in the *Accreditation and Certification* section.

Good luck with the assessment processes and the assessment outcome.

Where to from here?



How can I build on what I have learnt?



If you want to learn more about the curriculum reform and what it means for teachers, think about these things:

- study one of the other primary in-service units
- try to help another teacher with their learning
- take on special school responsibilities
 - develop the school assessment schedule
 - become the community liaison officer
 - become the school in-service coordinator
 - team teach with a colleague
- look for opportunities beyond your school for supporting others
 - in a nearby school
 - at the cluster or district level
- develop resources
 - for your own use
 - for the use of others in your school
 - for others beyond the school.

It is important for all teachers to have some professional development plans. Remember you can improve your skills and understandings by learning, doing, sharing and reflecting.

What are you going to do?

Inservice Units to Support the Implementation of the
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and Science**

**Accreditation and
Certification**

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The Context

Duration

Each unit has four modules. It will take you around 48 hours to complete a unit. You will need to work through this study guide completing *the Learn, Do, Share and Reflect* activities, doing any extra reading and, if you choose to seek accreditation, meeting the assessment requirements.

If you receive Recognition of Prior Learning called RPL (see page 5 of *Learning Contract*) it may take you less than 48 hours to complete the unit. This is acceptable to PNGEI because you have already met some of the requirements through your previous studies or work. If you have not done any academic studies lately, it may take you somewhat longer.

If you seek accreditation, you need to negotiate an expected completion date, as part of your learning contract. By this date you should have completed all assessment requirements and be ready to be assessed. Your assessor may also have been assessing you on a regular basis.

Learning tips

The Study Guide helps you do each module. Each module includes *learning, doing, sharing* and *reflecting* activities. These are all designed to help you achieve the learning outcomes of the unit. The Study Guide is also your *workbook* and *learning journal*. If you seek accreditation, you will need to submit the completed study guide to your assessor.

If you are studying off campus

This unit lets you study at home. There are many advantages to studying off campus:

- you study close to your home
- you can plan your study time to fit in with work or family commitments
- you can relate your study to your present job, to improve your learning.

There are also challenges. Learning this way needs discipline and motivation. Here are some tips for studying off campus.

Plan

Give priority to study sessions with a colleague. Make sure you allow enough time to travel to your meeting place, if you have to travel.

Make a study schedule and stick to it. Set specific days and times each week for study and keep them free from other activities.

In your learning contract note due dates for particular tasks.

In your study guide, for those activities where you are expected to work with others and share ideas, make note of appointments, your meeting place, time and so on, and plan for them.

Manage your time

Set aside a reasonable amount of time each week for your study program. If the bulk of the unit is done during NIST Week or PIST Week or another block of time, you may still have to complete certain activities in your own time.

Work in productive ways; discuss these with a colleague, your learning group or assessor.

Be organised

For your study, you will need the resources listed on pages 4-8. Resource 1 was sent to provinces in 2000 for distribution to schools. All other resources were sent to schools during 2003-2005. If you cannot find them in your school, ask your head teacher or the district inspector. Without these resource documents you won't be able to complete this unit. Once you have collected them, keep all your study materials organised in one place. Work through the unit systematically.

Find a good place to study

Most people need quiet and order to study effectively, so try to find a suitable place to do your work.

Ask for help if you need it

This is the most vital part of studying off campus. No matter what the difficulty is, ask for help straight away. Colleagues can help you in many ways. Some are described below.

Don't give up

You can access this unit in different ways. Once you have chosen your pathway, you should set up your support network and start to use it. Seek help when you need it and don't give up.

Some definitions

Colleagues, other teachers and education staff can help you in different ways. These include helping you by being a learning partner, a critical friend, a mentor, an imparter (facilitator) or an assessor.

A learning partner is a colleague with whom you have agreed to study. You may negotiate an arrangement to help you both to clarify ideas, brainstorm ideas and discuss plans and processes, and to generally support each other throughout your learning journey. This doesn't mean that you provide *joint* responses to the tasks and activities with your learning partner. You should make your own responses and they should be based on your own experiences, needs and context of work.

A critical friend is a colleague you trust and with whom you can work well. Critical friends give constructive feedback, ask thought-provoking questions, help you look at issues from different perspectives and help support change actions.

A mentor is a person who has a professional interest in you, is so willing to be a friend, guide, counsellor and/or a sounding board (that is, listens and responds to your ideas, issues and so on). A mentor may or may not be a colleague.

An imparter facilitates learning and provides input into the learning process. An imparter may not be approved to assess on behalf of PNGEI or TE&SDD.

An assessor is a person trained and approved by an authority such as PNGEI or TE&SDD, to facilitate learning, assess achievement and recommend an achievement grade in the context of the provision of this unit.

See page 3 of the *Learning Contract* for more information about the assessor.

Ways this unit can assist you

- **If self-improvement is your main goal**

If self-improvement is your main goal, you will be able to help yourself in the following ways:

1. lainim yu yet or with a colleague
2. lainim wantaim in groups, over time, as the need arises, or in a structured way with a facilitator.

There may be other ways too of meeting your needs.

The learning outcomes for the unit, the self-assessment of progress, the learning model – *Learn, Do, Share and Reflect* – you'll use, as well as the learning outcomes for each module can all help to guide and direct your learning journey.

Later on, if you would like to do some formal learning and would like to claim credit points for the work you do through this unit, you can enrol with PNGEI for external assessment as determined by PNGEI. The external assessment will be a task set by PNGEI for you to complete, not an examination.

- **If furthering your qualifications while improving yourself is your main goal**

If furthering your qualifications while improving yourself is your main goal, you will need to study the unit and meet the assessment and accreditation requirements of PNGEI. For this you must work with an assessor.

Three modes of learning are suggested here.

Mode1: Self-learning for self-improvement

This mode is described on page 8. You may wish to study by yourself or with the help of a colleague or in a group situation. If you wish to seek potential credit points, then you will need to enrol with PNGEI for external assessment. For this you will need to complete a task.

Mode 2: Off Campus face-to-face (with an assessor)

This means lainim wantaim in groups over a period of time to make up around 48 hours in a structured way:

- school-based or cluster-based (for example, 2 hours a week over a number of weeks)
- during NIST or PIST week as a one week course with follow up sessions
- as a one week course, including evening sessions.

Mode 3: On Campus face-to-face (with an assessor)

This means attending a PNGEI regional centre or a PNGEI Study Site, if they offer this unit as part of a course, and by meeting PNGEI assessment and accreditations requirements.

PNGEI regional centres are:

Gaulim Teachers' College	-	New Guinea Islands region
Kabaleo Teachers' College	-	New Guinea Islands region
Madang Teachers' College	-	Momase region
Holy Trinity Teachers' College	-	Highlands region
PNGEI	-	Southern region

PNGEI Study Sites are located in Daru, Balimo, Suki, Kiunga, Alotau, Samarai, Bolubolu, Losuia, Rabaraba, Pependetta, Kupiano, Berina, Wau, Bulolo, Kerema, Kilion, Baimuru, Vanimo, Aitape, Wewak and Maprik and other places. Contact PNGEI for further information.

For Modes 2 and 3 above, you will need to negotiate a learning contract with the assessor who will:

- approve and oversee your learning contract and any learning plan
- assess your work
- recommend an achievement grade to PNGEI.

Accreditation Requirements

The following describes the accreditation arrangement that has been negotiated with PNGEI for potential credit points towards DEP(I) or other qualifications including Certificate in Elementary Teacher Training (CETT), Diploma in Vocational Education (DOVET), Diploma in Special Education or further education.

All modes of study – self-learning, off campus face-to-face learning and on campus face-to-face learning - are acceptable to PNGEI.

Mode 1: Self-learning

In the self-learning mode, you are eligible for credit points only if you do an external assessment through PNGEI. A learning contract is not required for this. If you don't succeed the first time, you will have two more chances to enrol and pass the unit.

A pass means four (4) credit points for every unit you pass.

Mode 2: Off Campus face-to-face

If studying at a location away from PNGEI, but supervised by an assessor, then you must undertake assessment, if you are seeking academic credit.

Four (4) credit points are earned per unit for achievement of HD, D, C or P.

A fail (F) or an unfulfilled (UF) grade means no credit points. However, you can present yourself for external assessment at a later stage. You will have two chances to pass the unit through external assessment.

Mode 3: On Campus face-to-face

If studying on campus at a PNGEI regional centre or a study site established by PNGEI supervised by an assessor, then you must undertake assessment.

Four (4) credit points are earned per unit for achievement of HD, D, C or P.

A fail (F) or an unfulfilled (UF) grade means no credit points. However, you can re-enrol and attempt the course a second time.

Please note that any credit points earned are awarded only when you enrol for an appropriate course with PNGEI. Admission to courses will be according to PNGEI regulations. The higher your achievement grade (for example, HD, D) for a unit, the better your chances are for being admitted to PNGEI courses to further your qualifications.

If you complete all nine units successfully, you earn 36 credit points.

Certification requirements

The Certification Authority for academic credit is PNGEI. If you are seeking academic credit, you will need to:

- negotiate a learning contract
- enrol at PNGEI and pay course fees
- meet the assessment requirements.

Assessment requirements

Assessment has three components.

1. Self-assessment - compulsory, but not for academic credit

Self-assessment allows you to assess what you know and what you do not. This is not designed to be a rigorous challenge for Recognition of Prior Learning (RPL), but rather to motivate and sustain your interest. You should do the self-assessment again once you have reached the end of the unit, to assess and appreciate for yourself the progress you have made.

Self-assessment is compulsory in the sense that you will need to show your assessor that you have done it, at the beginning and at the end of the unit.

2. The process of learning - compulsory, but not for academic credit

We ask you to complete various tasks throughout this unit. The tasks include *learning*, *doing* (eg. investigating, surveying, etc.), *sharing* findings and information with others, and *reflecting* on the implications of the new knowledge and skills you have gained for your practice. The learning contract that you'll negotiate with your assessor will specify the range of tasks you will be expected to complete.

This component of assessment is compulsory in the sense that you will need to show your assessor that you have done the tasks specified in the negotiated Learning Contract.

If you want to, you can use the work you do on the tasks, as appropriate, as evidence that you can demonstrate the outcomes.

3. The results of learning - evidence to demonstrate achievement of outcomes, required for academic credit

If you are seeking academic credit, you need to provide evidence that you can demonstrate the achievement of outcomes. Successful completion of the unit leads to an award of High Distinction (HD), Distinction (D), Credit (C) or Pass (P), based on the achievement of the outcomes. It is up to you to provide evidence that you have achieved the outcomes.

Some of the evidence could come from your investigations and action. Some could come from your reflections. Wherever it comes from, however, you will need to identify the evidence and relate it to particular outcomes for your assessor.

The learning contract (see pages 1-8 of the next section)

We ask you to negotiate a learning contract with your assessor. This contract is designed to help you and the assessor to identify the knowledge and skills you already have and those that will need developing through the unit. It helps to personalize your learning. It also helps you to devise, with your assessor, ways you can demonstrate the learning outcomes you achieve.

You will find a blank copy of the learning contract for this unit in the next section, pages 1-8.

Enrolment and payment of fees

Mode 1: Self-learning

If you are seeking academic credit through external assessment, you should enrol directly with PNGEI at the beginning of a trimester. You can do this when you are ready to be assessed. There are three trimesters in a year. You must pay a course fee when you enrol. You can get information about course fees from PNGEI.

Mode 2: Off Campus face-to-face

If studying in your province with an assessor (that is, off campus face-to-face), you should enrol in the province with the assessor and pay the course fees to PNGEI account with Westpac Bank, Waigani, Account No. 007-00931201. You can get information about course fees from PNGEI.

Then, send your enrolment form and receipt of payment of the course fees to: Head, School of Education Studies, Primary Unit, PNGEI, PO Box 1791, Boroko, NCD, PNG.

Mode 3: On Campus face-to-face

If studying at a PNGEI regional centre or a PNGEI study site with an assessor (that is, on campus face-to-face), you should enrol with the regional centre or study site and pay the course fees to PNGEI account with Westpac Bank, Waigani, Account No. 007-00931201. You can get information about course fees from PNGEI.

You should then provide receipt of payment of the course fees to the course coordinator at the regional center or study site. The coordinator will then send your enrolment form and receipt of payment to: Head, School of Education Studies, Primary Unit, PNGEI, PO Box 1791, BOROKO, NCD, PNG.

Self-assessment of progress

Completing this task is a compulsory part of the assessment schedule. However, it will not contribute to the final grade.

Fifteen statements, numbered 1 to 15 are given below. Each statement is followed by a continuum with four markers identified on it. To assess yourself, mark where you are now, on each continuum, based on what you know at the beginning of the unit.

For example, look at Statement 1: *I am familiar with the structure and contents of the Mathematics syllabuses and teacher guides*. If you know a lot about the structure and contents of the Mathematics syllabuses and teacher guides, then you should make a tick close to 'very well', the third marker. If you know only a little bit about them, or are not sure yet, then put your tick close to 'little', the first marker. If you have been using the syllabuses and teacher guides, and are in a position to help others, then you should place the tick close to 'can help others', the fourth marker. Think about what evidence you could show to justify your self-assessment, if you were asked.

Now do this task as best as you can in order to maximise your learning.

1. I am familiar with the structure and contents of the Mathematics syllabuses and teacher guides.

little moderately very well can help others

2. I am familiar with the structure and contents of the Environmental Studies syllabus and teacher guide.

little moderately very well can help others

3. I am familiar with the structure and contents of the Science syllabus and teacher guide.

little moderately very well can help others

4. My understanding of how the aims of the primary curriculum, described in the *National Curriculum Statement (2002)* are reflected in the primary syllabuses may be described as

limited moderate extensive can help others

5. I understand why the Mathematics and Science syllabuses are structured the way they are.

little moderately very well can help others

6. My understanding of how to use the Mathematics and Science syllabuses may be described as

limited moderate extensive can help others

7. I am familiar with the curriculum principles discussed in the Mathematics and Science syllabuses.

little moderately very well can help others

8. I am familiar with the suggested assessment and reporting advice in the Mathematics and Science syllabuses and its links with the *National Assessment and Reporting Policy, 2003*.

little moderately very well can help others

9. I understand what I should do in my present capacity to fully implement the reform curriculum.

little moderately very well can help others

10. My ability to look at the primary curriculum in a holistic way (that is, in an integrated way) is

limited adequate very good can help others

11. My ability to understand and explain outcomes-based learning, teaching, assessing and reporting may be described as

limited adequate very good can help others

12. My ability to understand the curriculum expectations through curriculum principles, aims, learning outcomes and indicators in the syllabuses may be described as

limited adequate very good can help others

13. My ability to provide leadership in the implementation of reform curriculum may be described as

limited adequate very good can help others

14. I am aware of the national curriculum principles found in the *National Curriculum Statement (2002)*.

little moderately very well can help others

15. I understand the links between elementary, lower primary and upper primary subjects in the learning areas of Mathematics and Science.

little moderately very well can help others

On completing the unit, you need to do the *self-assessment* again to see for yourself what progress you have made by doing all the learning activities.

Inservice Units to Support the Implementation of the
Primary Reform Curriculum

Unit 4:
**Learning Areas: Mathematics
and Science**

Learning Contract

The learning contract is only required if you seek academic credit through PNGEI in the off campus or on campus face-to-face modes

The learning contract provided here is a sample for your information. Your assessor can provide a copy of the learning contract with PNGEI insignia on it, if you need one.

Learning Contract

The learning contract is only required if you seek academic credit through PNGEI in the off campus or on campus face-to-face modes.

The learning contract provided here is a sample for your information. Your assessor can provide a copy of the learning contract with PNGEI insignia on it, if you need one.

Use this learning contract as a basis for discussion with your assessor before you begin this unit. During this discussion, you and your assessor will negotiate

- the outcomes, if any, for which you may seek recognition of prior learning (RPL)
- the activities you will undertake on your own
- the activities you will undertake as part of a group or with a colleague
- the evidence you will show to prove that you have met the learning outcomes of the unit.

Complete the learning contract before you start your study. Give a copy of the agreed contract to your assessor.

Any later changes to the contract should be re-negotiated, agreed upon, and signed off by both you and the assessor.

Learner: Name: _____ Sex: M/F

File No. _____

Position/Location: _____

Assessor: Name: _____ Sex: M/F

File No. _____

Position/Location: _____

Expected completion date: _____

Assessor Information

Who is an assessor?

An assessor is

- a skilled, experienced educator with professional integrity and good communication skills
 - acceptable to PNGEI as an assessor
 - trained by TE&SD, PNGEI and Curriculum Reform Implementation Project (CRIP)
 - nominated by the provinces, PNGEI and its regional centres.
-

What does the assessor do?

The assessor

- facilitates learning in the off-campus and on-campus face-to-face modes of delivery
 - approves and overviews your learning contract and any learning plan
 - checks that you have met all assessment requirements prior to assessment
 - assesses your work
 - recommends an achievement grade to PNGEI.
-

How do you find the nearest assessor?

- A list of assessors' names, locations and contact details will be made available, as they are selected and trained. This list will come out in a PNGEI Circular to provincial education offices, district offices and head teachers of schools directly.
 - This list will also be published in the PNGEI Handbook.
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How are assessors paid?

- PNGEI-approved assessors trained to work in the off campus face-to-face mode (that is, external assessors) are paid an incentive as determined by the Governing Council of PNGEI.
 - PNGEI staff trained as assessors to work in the on campus face-to-face mode (that is, internal assessors) work to PNGEI conditions.
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Unit learning outcomes

On successful completion of this unit, you, the learner, can (are able to):

1. describe the structure and contents of the syllabuses and teacher guides in the Mathematics and Science learning areas
2. identify links between the syllabuses and the corresponding teacher guides
3. make connections between the Mathematics and Science learning areas
4. describe and discuss ways progress from grade 3 to grade 8 is described in the Mathematics and Science learning areas
5. use the syllabuses and teacher guides to construct units of work based on learning outcomes
6. make links between the syllabuses and teacher guides and the *National Curriculum Statement (2002)* and the *National Assessment and Reporting Policy, 2003*
7. assist others to understand and use these syllabuses and teacher guides.

Declaration

I declare that the work I have provided as evidence of achieving outcomes is as negotiated with my assessor and is consistent with my learning contract.

I have acknowledged all sources of information that have contributed to my work.

Learner..... Date.....

Assessor..... Date.....

Sources of information (Human, print, other):

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Learning Areas: Mathematics
and Science

Final Steps

Final Steps ...

Now you are almost ready to start work. To make sure you've done all your preparation for seeking academic credit, check the following.

	Yes/No/	Not Applicable
I have done the initial self assessment		
I have negotiated my learning contract		
I have access to the resource documents		
I understand what I should do to meet the assessment requirements		

If you have said 'yes' or 'not applicable', as appropriate, to the above, then you are ready to get into the modules of this unit. If you have said 'no' to any of them, then you should re-consider why you are doing this unit.

The modules are written in a 'self-learning mode'. You are guided each step of the way. Follow the instructions and you will be able to complete the modules.

If you are seeking academic credit, then remember that you *must* work with an assessor or enrol for external assessment. The colleague you work with can also be your learning partner, mentor, critical friend or facilitator (imparter).

Gut lak long stadi bilong yu