Measurement - Introduction

This section provides a selection of practical, hands-on activities that focus on aspects of measurement and time which are needed for full participation in mainstream Australian society. The activities encourage students to engage with measurement and time language and concepts, as well as the systems used to measure them. They prompt learners to share existing knowledge in pairs and small groups and to extend that knowledge through exploration, visualisation and estimation, coupled with accurate measurement. These aspects all play a role in gaining a 'sense' of measurement.

Gaining a 'sense of measurement'

Traditional teaching of measurement tends to focus on using formula for calculating area and volume and using rote learned rules for converting between units. What it does not do is enhance students' 'sense of measurement': knowledge which would give meaning to the results of the calculations and allow learners to answer the important question: 'Is this answer reasonable?'

Having a 'sense of measurement' means that if we hear measurements, such as someone 'is 195 cm tall' or we need '8 litres of water' to mix with a cleaning product, then we have an idea of what that looks like: we can visualise it or make some meaning from the information.

This ability to visualise usually depends on our own 'personal references' or 'benchmarks': things that we refer to in order to compare the quantity and gain a sense of its size. For the examples above, our own height or the volume of a household bucket would serve as useful references. Similarly, the times taken for common activities serve as a reference for judging less familiar time intervals.

Personal references or 'benchmarks'

This section contains a number of 'guess, estimate and measure' activities: *'Estimating Lengths in Metric Units', 'Estimating Metric Volumes?', 'How Heavy is that?', 'Paces is Estimating Metres'* and *'How Far will my Plane Fly?'* Their purpose is to develop students' strategies to estimate measurements using personal references: hand spans, arm lengths or paces for judging lengths or distances; common household objects like buckets, cups and spoons for estimating volume and familiar supermarket items, such as rice, pasta, sugar or potatoes for comparing weights. Similarly, *'Just a Minute'* invites students to judges when a minute has elapsed and to estimate and measure what can be done in that time.

In addition to these, a series of short, cooperative pair and small group discussion activities, such as *'Matching Metrics', 'Metric True or False'* and *'The One Most Likely'*, provide stimulus for learners to share and extend their existing personal

references and metric general knowledge using a variety of questions which allow for diverse learner contributions.

Practical measuring

Many adults in lower level numeracy classes come from cultural backgrounds which have provided very little experience with formal measurement of any kind. For this reason, simple, introductory practical activities, such as *'Making a 5 metre Measurer', 'How Far will my Plane Fly?'*, *'Taller or Shorter?'* are included for them to appreciate straightforward measuring devices, techniques and units for measuring length and distance.

In addition to these introductory activities, the estimation activities also provide accurate measurement practice, since students check their estimates using appropriate measuring instruments.

The practical tasks in this section advocate using a variety of common household measuring tools, such as, dressmakers' and builders' tape measures, kitchen scales, measuring jugs and the like. These will encourage students to read a range of simple measuring scales, especially if a variety of brands and devices can be used.

For students who need to learn to read more complex measuring scales there are a number of practice sheets and templates included in the *'Decimals'* Section: *'Exploring Decimals on Measuring Scales'*, to provide further experience. The templates included can be used by teachers to create additional examples specific to students' needs.

Language of time and measurement

Development of students' ability to use the language associated with measurement and time is an ongoing theme within the activities in this section. This means that interpreting and using descriptive and comparative vocabulary, such as length, width, height, weight, long, tall, wide, shorter, heavier, are integral to all of the activities in this section. In some cases, such as *'Back to Back Times',* listening to and interpreting the language of time is the explicit purpose of the activity. In others, language based tasks are included as a significant part of the activity and the Practice Sheets, along with the estimation and measurement. For example, *'How Far will my Plane Fly?', 'Taller or Shorter?' and 'Matching Times'.* The meaning of metric prefixes, another important aspect of the language of measurement, is also addressed as a language issue within several of the activities, particularly those which concentrate on knowing how the units interconnect to form the metric 'system' of measurement.

Knowing the metric system

The activities *'Sorting and Ordering Units of Measurement'* and *'What do we use this for?'* are small group or pair activities which explore students' initial knowledge of the commonly used units of time and the metric system and how they fit together. This

knowledge can then be expanded and formalised through class discussion with *'Knowing the Metric System'.* These activities complement the discussion activities that focus on 'personal references' and a 'sense of measurement'.

'Converting Units in Context' is an activity which combines metric system knowledge and practical measurement, as well as calculations which involve converting between units such as metres and centimetres, millilitres and litres.

The *'Metric Quizzes'* activity consolidates all of the knowledge covered in the section and is ideal for one or more lively revision sessions.

Knowing the systems for time

Five sets of cards of graduating difficulty in the *'Matching Times'* activity perform a similar function for the systems of time and the relationships between them. They cover days, weeks, months and years as well as analogue, digital and 24 hour time. There is also a particular focus on common fractions (½, ¼) and language for expressing the time units. Some of the sets of cards concentrate on differing methods of representing time, through words, symbols and the analogue clock face, and on students' capacity to move comfortably from one to the other.

An extension described in the '*Back to Back Times*' activity provides practice in calculating time intervals.