Numeracy learning progression and Digital Technologies

Purpose of the literacy and numeracy progressions

The purpose and intent of the progressions are to provide a tool to:

- locate the literacy and numeracy development of students
- plan for student progress in literacy and numeracy
- facilitate shared professional understanding of literacy and numeracy development
- support a whole school approach to literacy and numeracy development.

Literacy and numeracy in the learning areas

The learning areas provide rich opportunities for extending and enriching literacy and numeracy. To effectively plan for differentiated teaching of literacy and numeracy in the learning areas, teachers draw on their knowledge of the Australian Curriculum and their knowledge of their students. Recognising that students learn at different rates, the progressions provide a continuum for teachers to identify and build on students' literacy and numeracy skills. The intention is that students will develop their literacy and numeracy expertise purposefully, in meaningful contexts.

Using this advice and the progressions to plan for student progress in literacy and numeracy

This advice illustrates how the progressions can be used in Digital Technologies to support student progress in literacy and numeracy. This advice:

- identifies the sub-elements of the progressions that are most relevant to studying Digital Technologies
- identifies some aspects of an achievement standard that include literacy or numeracy demands
- lists some relevant indicators at one or more levels of the progressions to illustrate how the progressions might be unpacked to support student progress in literacy and numeracy in the study of Digital Technologies.

Figure 1 illustrates how the progressions are to be used by teachers to identify where students are at on the literacy and numeracy continuum and plan for their ongoing development within the learning areas. Therefore, this advice can support use of the progressions in developing explicit and targeted programs to ensure students are able to access discipline-specific knowledge, concepts, understanding and skills. While advice is provided on the most relevant sub-elements of each progression for the discipline of Digital Technologies, whole school planning may address other sub-elements to progress students' literacy and numeracy.

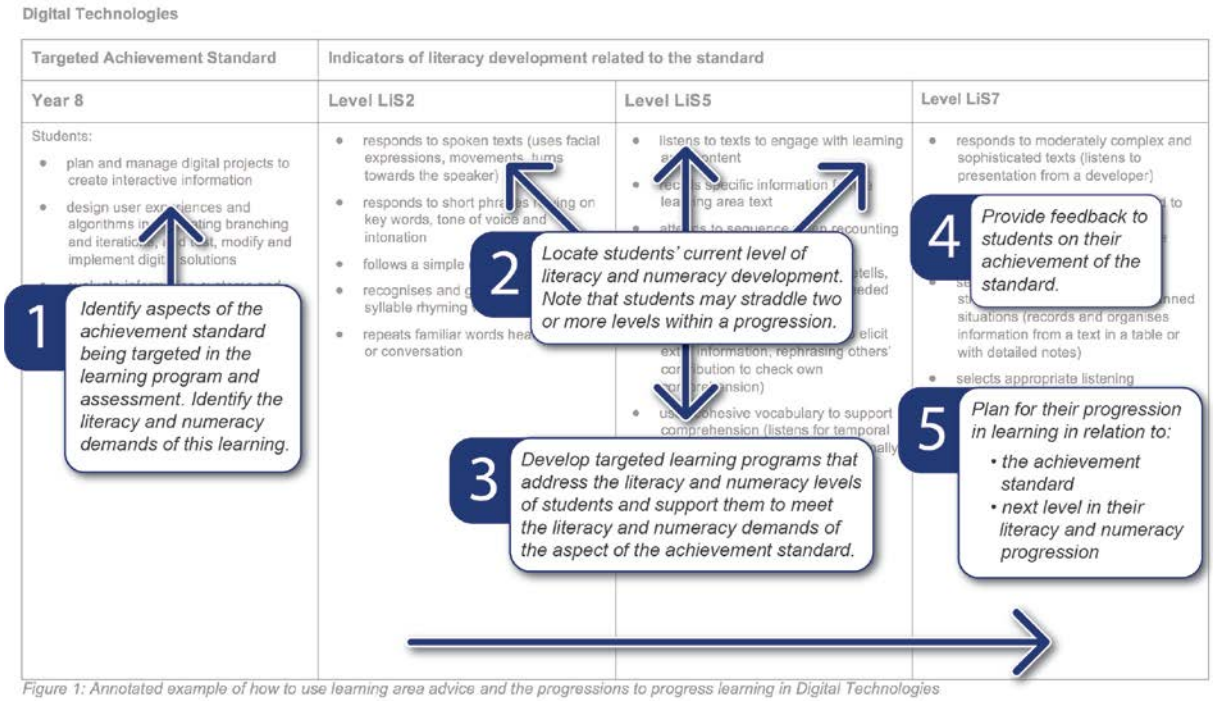

Figure 1: Annotated example of how to use learning area advice and the progressions to progress learning in Digital Technologies

Numeracy in Digital Technologies

Students need to be numerate as they develop the knowledge and skills to use mathematics effectively in all learning areas of the Australian Curriculum and in their lives more broadly. Supporting students' numeracy in learning areas will enhance and supplement the content learning by ensuring they have the numeracy skills which allow them to access and understand the content area and demonstrate their knowledge and understanding. Learning in Digital Technologies requires students to recognise and understand the role of mathematics in the world and have the dispositions and capacities to use mathematical knowledge and skills purposefully as they create digital solutions for a range of purposes. Students need to interpret and use mathematical knowledge and skills in a range of real-life situations. They will use number to calculate, measure and estimate; interpret and draw conclusions from statistics; measure and record throughout the process of generating ideas; developing, refining and testing concepts; and costing and sequencing when creating digital solutions and managing projects.

Planning for student progress in numeracy in Year 8 Digital Technologies

The highlighted text below indicates where there are numeracy demands in the Digital Technologies achievement standard.

By the end of Year 8, students distinguish between different types of networks and defined purposes. They explain how text, image and audio data can be represented, secured and presented in digital systems.

Students plan and manage digital projects to create interactive information. They define and decompose problems in terms of functional requirements and constraints. Students design user experiences and algorithms incorporating branching and iterations, and test, modify and implement digital solutions. They evaluate information systems and their solutions in terms of meeting needs, innovation and sustainability. They analyse and evaluate data from a range of sources to model and

create solutions. They use appropriate protocols when communicating and collaborating online

Using the numeracy progression to support students in Digital Technologies

The most relevant sub-elements of the numeracy progression for Digital Technologies are those within:

- Number sense and algebra
- Measurement and geometry
- Statistics and probability

These elements are essential for students to develop discipline-specific knowledge, understanding and skills and to demonstrate the learning described in the Digital Technologies achievement standard. Specific examples are shown in brackets (example). Many numeracy sub-elements could be relevant to Digital Technologies but are dependent on the selected context for creating digital solutions. For example, position and location may be very relevant when developing an app requiring geolocation. The indicators identified below are only some examples.

Tables 2 to 4 focus on Year 8 but also reflect where similar or more sophisticated demands may be required in Year 10.

Numeracy

Table 2: Numeracy indicators for *Number sense and algebra* related to the achievement standard

Targeted Achievement Standard		**Examples of how indicators relate to the AC standard.** *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*				
Year 8	**Number sense and algebra**					
	Quantifying numbers	**Additive strategies**	**Multiplicative strategies**	**Operating with decimals**	**Operating with percentages**	**Number Patterns and algebraic thinking**
Students: design user experiences and algorithms incorporating branching and iterations, and test, modify and implement digital solutions	**QuN12** • recognises, reads and interprets very large and very small numbers		**MuS6** • applies known multiples and strategies for division to mentally calculate (to find 64 divided by 4, halves 64 then halves 32) (considers file size when designing web sites)			**NPA6** • predicts a higher term of a pattern using the pattern's rule (creates complex patterns when developing algorithms and coding) **NPA7** • uses words or symbols (including letters) to express relationships involving unknown values (uses variables when writing algorithms and code)

Table 3: Numeracy indicators for *Measurement and geometry* related to the achievement standard

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
Year 8	**Measurement and geometry**
	Understanding units of measurement
Students: explain how text, image and audio data can be represented, secured and presented in digital systems	**UuM8** • recognises the relationship between metric units of measurement and the base-ten place value system (applies understanding of binary numbers)

Table 4: Numeracy indicators for *Statistics and probability* related to the achievement standard

Targeted Achievement Standard	**Examples of how indicators relate to the AC standard.** *Individual student numeracy may be at different levels of the progression as indicated in Figure 1.*
Year 8	**Statistics and probability**
	Interpreting and representing data
Students: explain how text, image and audio data can be represented, secured and presented in digital systems	**IRD5** • recognises that continuous variables depicting growth or change often vary over time (growth charts, temperature charts) • interprets graphs depicting motion such as distance–time graphs • interprets and describes patterns in graphical representations in real-life situations (represents data using a range of approaches, eg infographics) • interprets the impact of outliers in data
analyse and evaluate data from a range of sources to model and create solutions	**IRD5** • determines whether to use data from a sample or a population • determines what type of sample to use from a population • makes reasonable statements about a population based on evidence from samples • interprets the impact of outliers in data • uses graphical representations relevant to the purpose of the collection of the data • uses features of graphical representations to make predictions • recognises that continuous variables depicting growth or change often vary over time (growth charts, temperature charts) **IRD6** • applies an understanding of distributions to evaluate claims based on data (the larger the sample taken, the more accurate the prediction of the population value is likely to be) (checks authenticity of data set)