

PAT Vocabulary Skills

Assessment framework



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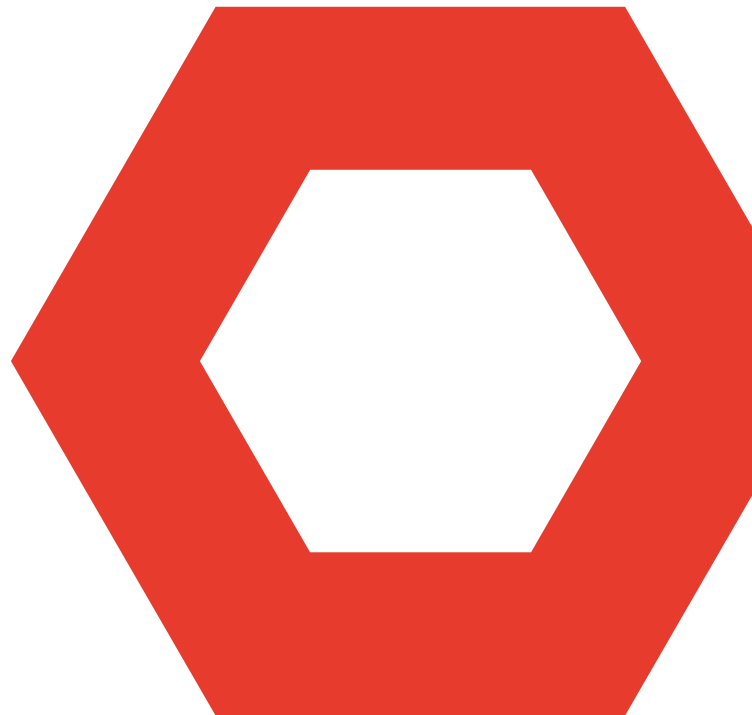
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Introduction

The ACER Progressive Achievement Tests in Vocabulary Skills, commonly known as *PAT Vocabulary Skills*, are a set of online assessments that allow teachers to identify the extent of students' vocabulary skills, to diagnose gaps, strengths and weaknesses in student learning, and monitor student progress over time. The assessments have been developed especially, but not exclusively, for use in Australian schools. The *PAT Vocabulary Skills* construct is appropriate for broad international use.

PAT Vocabulary Skills (2019), comprises five test forms recommended for students in Years 2 to 10. It is offered alongside *PAT Vocabulary* (2007), comprising five test forms recommended for students in Years 3 to 10. *PAT Vocabulary* assesses word knowledge through identification of synonyms. *PAT Vocabulary Skills* assesses a broader range of vocabulary skills. The construct expands the kinds of processes that are likely to support students' improved vocabulary beyond the identification of synonyms.



Rationale for PAT Vocabulary Skills

Vocabulary is central to comprehension and learning with understanding. Students with limited vocabularies will inevitably have limited comprehension skills and consequently little understanding of what they are learning. All students need to be continually expanding and enriching their vocabularies as they move through school in order to meet the increasingly complex intellectual demands of higher year levels. Teachers at all year levels need to identify the extent of students' vocabularies in order to support them to improve.

The *PAT Vocabulary Skills* assessment is based on research evidence about the importance of a vocabulary that is both broad and rich in interconnections between known words. Also important is an understanding of the contexts in which words are used and how words might be associated, and of how roots and affixes can influence the meaning of words. *PAT Vocabulary Skills* was developed in recognition of the critical importance of vocabulary skills to student learning and progress and the need for a broader construct than identifying a synonym for a word in *PAT Vocabulary*.

Progressive Achievement approach

The Progressive Achievement approach provides a framework for integrating student assessment, resources that support teaching practice, and professional learning. PAT assessments allow teachers to collect evidence of student learning; to identify where students are in their learning at a given point in time; to monitor growth over time; and to reflect on student attainment. They provide reliable measures that enable a variety of interpretations about attainment and progress, such as:

- what students attaining specific levels of progression are likely to know, understand and be able to do;
- how much students have improved over time and what skills, knowledge and abilities they have been able to develop; and
- how a student's level of attainment compares with other students.

The value of an integrated approach to assessment and student learning has become widely acknowledged. There is now a wide variety of formative, diagnostic assessment tools used in Australian classrooms. Summative assessments, such as NAPLAN, are also often used to inform teaching and learning. As Dylan Wiliam makes clear (2011, p. 43) 'any assessment is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about the next steps in instruction'. In his Report, David Gonski (2018, Finding 7) refers to the compelling evidence that 'tailored teaching based on ongoing formative assessment and feedback is the key to enabling students to progress to higher levels of achievement'.

ACER's PAT tests provide indicators of student achievement via scale scores and the accompanying achievement band descriptions. Upon completing their assessments, students are allocated a scale score that represents their ability in vocabulary skills. The scale is divided into achievement bands from which the skills and understanding represented at each level are described. The achievement bands provide valuable evidence-based information about the concepts and skills students have achieved, are consolidating, and are working towards. As the Gonski Report recommends, reporting on assessment should have an emphasis on achievement and growth and that the growth should be measured against learning progressions (2018, Recommendation 4). Masters (2013) also expresses the idea that learning should be assessed by measuring growth over time and against empirically derived learning progressions.

The PAT reports provide targeted formative feedback, allowing the student data to be sorted and analysed in a variety of ways. Using the PAT data and the achievement band descriptions, teachers can structure learning specifically to students' needs rather than where they are expected to be.

Progressive Achievement in Vocabulary Skills

In *PAT Vocabulary Skills*, vocabulary is defined in terms of breadth and depth. Breadth refers to how many words are known, at least at a superficial level, and depth refers to how well those words are known. Progression in breadth is from knowing the meaning of a few familiar words to knowing the meaning of many uncommon and rare words. The frequency of occurrence of known words indicates the likely breadth of vocabulary knowledge, as small vocabularies mainly consist of familiar, high-frequency words, with increasingly larger vocabularies including a wide range of common, and then uncommon words. Very large vocabularies include many rare words. The descriptions of the achievement bands on the *PAT Vocabulary Skills* scale reflect this, referring to familiar words in the lower achievement bands, then common and uncommon words in the middle bands, and rare words in the higher achievement bands.

The basis for the categorisation of word familiarity was consideration of the word frequencies in several large corpuses of writing¹, in conjunction with consideration of the contexts in which a student is likely to encounter a word, and consideration of the overall difficulty of the task.

The progression in vocabulary depth is from limited and superficial knowledge of the meaning of the word to a nuanced appreciation of meaning and of how context can change the meaning. Progression begins with relatively disconnected knowledge of word meanings and moves to increasingly rich and diverse associations between words, reflected in an increasing capacity to differentiate between words of similar meanings, and to categorise words using increasingly abstract criteria, as well as a broadening knowledge of word derivations and increasing sensitivity to the ways word meanings might vary with changing context or usage.

As words become less common, they are typically only encountered in written texts, so students who are avid readers of a wide range of high-quality texts are more likely to develop broad, rich vocabularies than students who rarely read. Teachers can also promote the development of deep, rich vocabularies in their students by deliberately using a wide range of vocabulary in their teaching and encouraging students to learn and use the new words themselves.

PAT Vocabulary Skills maintains the focus on progressive achievement. The tests are on a common scale, allowing progress to be reported longitudinally. The five tests are of increasing difficulty, so teachers are able to select the tests that are most appropriate for students' levels of vocabulary skill.

PAT Vocabulary Skills and curricula

The Australian national curriculum and all state curricula expect students to develop an increasingly broad and rich vocabulary as an integral part of improving their literacy skills across all learning domains. Vocabulary skills are a key component of comprehending written and spoken text and of producing spoken and written texts.

The Australian Curriculum: English describes the kind of vocabulary students should be reading and using in the year level descriptions and the Achievement Standards at every level of the curriculum. Vocabulary skills are very occasionally the focus of a content description, but in most cases, they are an integral part of content descriptions that have another focus. The extent of students' expected vocabulary skills at any year level is typically implied in many of these content descriptions through the kinds of issues and ideas students need to discuss, express, interpret and analyse. The key role of vocabulary in underpinning most of the English curriculum means that links between PAT Vocabulary skills and the curriculum should be contextualised in terms of the current aspects of the curriculum that are being taught. Almost any English content descriptions require vocabulary skills.

Vocabulary skills are not just taught in English, these skills are taught and applied across all the learning domains.

¹ British National Corpus www.natcorp.ox.ac.uk; Corpus of Contemporary American English <https://corpus.byu.edu/coca>; Oxford Children's Corpus <https://blog.oxforddictionaries.com/tag/oxford-childrens-corpus>

Construct

Definition

A construct is a description of an ability that can be measured on a single dimension (with a single numeric variable). It often refers to 'what students know and can do'. A mathematical model is used to transform observations (eg student responses to test items) into measurements. A careful definition of ability/proficiency helps ensure that the assessment and reporting are consistent and legitimate.

Vocabulary is more than knowing discrete words and definitions of their meaning or synonyms. Additional conceptual levels of understanding and cognitive processes are involved in applying word knowledge to determine and express meaning. In listening and reading, new words, or new uses of familiar words, are frequently encountered. Coping with these new words and meanings requires developing cognitive strategies to understand these words in context. Rich vocabularies have breadth and depth. Breadth means that students know the meanings of many words, and depth means that they also have rich associations with, and between, the words they know. They are readily able to identify related words, differentiate the meaning of similar words and recognise where a word may have different meanings depending on the context.

Having a broad, rich vocabulary allows students to continue to improve their vocabulary. They can learn new words in any context where they already know almost all of the words that they are hearing or reading. Their existing vocabulary provides sufficient support to infer the meaning of the occasional unknown word. Students with low levels of vocabulary struggle to learn new words in many contexts because there are too many words they do not know, so there is insufficient support for inferring meaning.

A rich vocabulary is essential in developing listening and reading comprehension from the earliest years (Graves, 2006; Hairrell, Rupley, & Simmons, 2011; National Reading Panel, 2000). Language-rich early years environments are critical. As early as second grade, children with larger vocabularies read words more accurately (Snow, Tabors, Nicholson, & Kurland, 1995), and even stronger relationships between rich vocabularies and good comprehension emerge in later years when students read more complex texts (National Early Literacy Panel, 2008; Storch and Whitehouse, 2002; Senechal & LeFevre, 2002). Walker, Greenwood, Hart, and Carta (1994) found that children with poor language and vocabulary skills during the early years of school were the lowest achievers in reading and related literacy skills, and in language and vocabulary skills seven years later.

The content of the *PAT Vocabulary Skills* construct describes the scope of the vocabulary skills that are assessed with a focus on both breadth and depth. The need for students to use other comprehension skills is minimised. The reading load is light and the items involve single words, single sentences or very short texts. Words are kept as simple as possible, except for the targeted vocabulary. The assessment helps teachers to identify students with limited vocabulary that is highly likely to be impeding their progress, as well as identifying students with good vocabularies who may not be utilising their skills effectively, or who may need more challenging work.

Structure

The *PAT Vocabulary Skills* construct is the organising principle of the assessments; it is used to guide test development and structure the PAT reports. This structure is also part of the Progressive Achievement approach because the knowledge, skills and understanding represented in the assessments is designed to support educators in identifying student needs.

Strands

There are four process strands in *PAT Vocabulary Skills* that describe some key ways that students know and understand vocabulary:

- Knowing – knowledge of meaning and definitions
- Applying – identifying synonyms and inferring meaning from context
- Categorising – sorting words into conceptual categories and ordering words within a category by degree
- Morphology – understanding and use of morphemes

At lower levels of the progression, students know fewer words and their knowledge of the meaning of those words is frequently superficial. As students progress, the number of words they know expands and the depth of their knowledge about those words increases.

Knowing

This strand describes knowing the meaning of words where there is no support that would enable a student to derive the meaning of the word from context. This skill is heavily reliant on prior knowledge and has a degree of automaticity in recall, so that students do not spend time processing the meaning. Identifying the definition of a word or matching labels to an image are classified as knowing. Progression is evident in the initial linking of familiar words to simple definitions, or common illustrations, through to making fine distinctions between the definitions of uncommon words as well as recognising the meaning of words that are frequently misused or confused.

Applying

This strand describes recognising close relationships between different words such as identifying synonyms. The strand also describes understanding words as they appear in contexts that support the reader to identify the specific meaning or general sense of the word by implying the meaning. Contextual clues include the way that a word is used or the tone of the sentence in which it appears. Contextual support may be provided in the text or in an image. Progression is evident from the initial identification of a familiar synonym where other options are largely unrelated words, through to the capacity to make increasingly fine distinctions between words. Progression is also evident in the initial use of obvious contextual clues that support familiar meanings through to utilising subtle contextual clues, or negotiating competing information, in order to identify the meaning of less common words or unusual word usage.

Categorising

This strand describes the skill of sorting words into conceptual categories, or ordering words within a category by degree. This strand incorporates knowledge of how words relate to other words at an abstract level, and may include some degree of reasoning about what a given set of words mean in relation to each other. Providing a list of words and identifying those that 'go together', or ordering words within a single conceptual category by degree, such as from least to most, are examples of categorising. Progression is evident in the initial categorisation of largely familiar words into clearly distinct and familiar categories, through to the categorisation of many less common words into sophisticated abstract categories or categories that require subtle differentiation between the meanings of words.

Morphology

This strand describes the understanding and use of morphemes to support interpreting the meaning of words. Morphemes are the smallest units of meaning in a language. *PAT Vocabulary Skills* focuses on affixes and roots, which are sub-word level units of meaning. *PAT Vocabulary Skills* does not presuppose that students have been explicitly taught the meanings of affixes and roots. If a question does address the meaning of an affix or a root, it is intended that this meaning be derived from knowledge of the meanings of the whole words that are presented. Identifying the meaning of a prefix used in a group of words or selecting the correct prefix to change the meaning of a word in a given way are examples of use of morphology. Progression is evident in the initial recognition of familiar affixes and roots in common words, through to understanding how affixes and roots contribute to meaning in less familiar words, or in contexts where the meaning of the affixes or roots is inconsistent, or where affixes or roots are also less familiar.

Assessment design

Measuring the construct

In developing items and designing the tests, the major criteria considered are as follows:

- distribution of items across strands
- distribution of item difficulty

Distribution by strand

Each item is classified by strand with an item description that provides more detail about the skill that the item addresses. All the tests include items that assess each strand, but the strand distribution varies across the tests.

Table 1 Percentages of PAT Vocabulary Skills items by strand for each test

Test level	Strand %			
	Knowing	Applying	Categorising	Morphology
Test 1	52	26	19	4
Test 2	20	43	23	13
Test 3	3	42	45	9
Test 4	3	40	43	14
Test 5	8	47	37	8

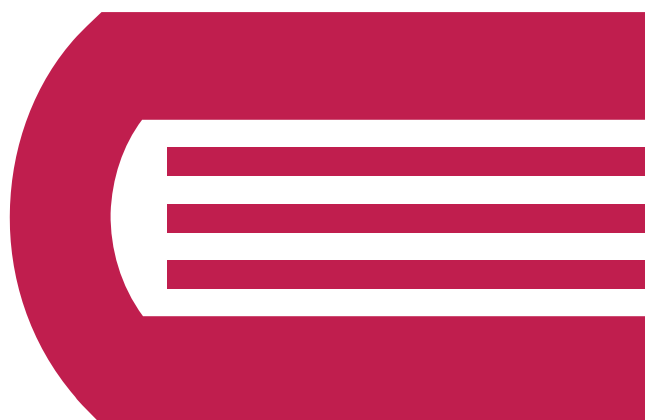
Test 1 has a higher proportion of Knowing items as this is the easiest test. In the subsequent tests, there are few Knowing items as students are expected to not only know, but also be able to apply their knowledge of word meaning, categorise words and infer the meaning of roots and affixes.

Distribution of item difficulty

It is important to have a spread of item difficulties that match the abilities of the students. Where there are sufficient items, there is also a range of difficulty within the strands in each test. There is overlap in difficulty of the tests as well as overall progression in difficulty. Below is the mean difficulty of the items in each of the *PAT Vocabulary Skills* tests in scale score units, with their standard deviations. Standard deviation measures the amount of variation in item difficulty for a set of items.

Table 2 Mean difficulty and standard deviation of each *PAT Vocabulary Skills* test

Test level	No. of items	Mean item difficulty (scale score)	Standard deviation (scale score)
Test 1	27	93.3	9.5
Test 2	30	106.2	8.3
Test 3	33	118.3	7.8
Test 4	35	130.4	8.0
Test 5	38	140.4	7.6



Delivery

Choosing the right test

Planning and consistency are important in ensuring *PAT Vocabulary Skills* is used effectively and that students' results are useful and meaningful. Teachers need to select appropriate tests that match their students' current vocabulary skills.

Students require sufficient reading proficiency to be able to read and understand the simple instructions and brief questions as well as the vocabulary words that are being assessed. Reading load is kept to a minimum as this is not an assessment of reading. Students need to be able to respond to multiple-choice, hot spot, drop-down, and drag-and-drop type items. There is no audio support and no text input is required.

Each test stands alone with items of a wide range of difficulty and no common content. The range of difficulty of each test overlaps with adjacent tests. The test numbers indicate increasing difficulty and are not matched to year levels. Test 1 is the easiest test and focuses on common vocabulary used in familiar contexts. It is generally suited to students in lower primary who are able to read, but it may also be suited to older students with limited vocabularies. Test 2 is suited to middle primary, Test 3 to upper primary and Test 4 to lower secondary. Test 5 is the hardest test, with most of the words being uncommon or rare and the contexts sophisticated and abstract. Test 5 is generally suited to students with good reading skills in middle secondary, but may also be suited to slightly younger secondary students who are excellent readers with broad vocabularies.

Table 3 Summary of test delivery details for *PAT Vocabulary Skills*

Test level	Generally suitable for	Indicative content and skills assessed	No. of items	Time allowed
Test 1	Lower primary (Year 2)	Recognise and sort familiar and common vocabulary in familiar and everyday contexts	27	35 minutes
Test 2	Middle primary (Year 3, Year 4)	Apply knowledge of common words and a few familiar prefixes and infer the meaning of some uncommon words in everyday contexts	30	40 minutes
Test 3	Upper primary (Year 5, Year 6)	Apply, categorise and infer the meaning of common and uncommon words and familiar prefixes in a range of contexts	33	
Test 4	Lower secondary (Year 7, Year 8)	Apply knowledge of many uncommon and some rare words and recognise some Latin and Greek roots	35	45 minutes
Test 5	Middle secondary (Year 9, Year 10)	Recognise, differentiate between, infer the meaning of, categorise and order many rare words including words with Latin and Greek roots	38	

Frequency

For the purpose of monitoring student progress, a gap of 9 to 12 months between testing sessions is recommended. Learning progress may not be reflected in a student's scale scores over a shorter period of time. Longitudinal growth should be measured over a minimum of two years of schooling, or three separate testing sessions, in most contexts. This will help account for possible scale score variation, for example where external factors may affect a student's performance on a particular testing occasion.

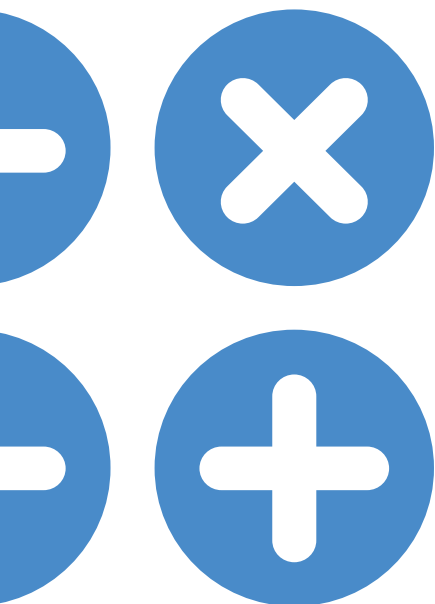
Test administration

Teachers are required to supervise test administration and ensure students are not accessing the internet on other devices to identify word meanings or using online dictionaries or thesauri. Practice items are embedded to support administration of the tests. The recommended test administration time is 35–45 minutes, depending on level. This should be sufficient for all students to complete their practice and test items. Students with good vocabularies may finish sooner. Consistency in the time allowed to students will assist teachers in comparing the results of students.

Item response formats

A range of item formats and contexts are used in the tests. Multiple-choice items allow students to select the word to match a definition, match an image to a word, identify a synonym for a word, identify the implied meaning of a word, and identify the effect of an affix or the implied meaning of a root across a group of words with the same root. Drag-and-drop items allow students to sort, group and order words, and place labels correctly. Drop-down menus allow students to identify appropriate affixes to provide given meanings, and select appropriate vocabulary within the context of a sentence.

The item formats are selected to be most appropriate for the skills being assessed in order to keep the wording to a minimum and make it as clear as possible what the students are being asked to do. For example, all sorting and classifying tasks are drag-and-drop so students literally sort the words into separate locations and can see the results of their sorting as they do it. Examples of different item types are provided in Appendix 3.



Reporting

The information provided by the *PAT Vocabulary Skills* reports is intended to assist teachers in understanding their students' abilities in vocabulary, diagnosing gaps, strengths and weaknesses, and measuring learning progress over time.

PAT scale score

A PAT scale score is a numerical value given to a student whose achievement has been measured by completing a PAT assessment. A student's scale score lies at a point somewhere on the specific PAT scale, and it indicates that student's level of achievement in that particular learning area – the higher the scale score, the more able the student.

Regardless of the test level or items administered to students, they will be placed on the same scale for the learning area. This makes it possible to directly compare students' achievement and to observe students' progress within a learning area by comparing their scale scores from multiple testing periods over time.

Item difficulty is a measure of the extent of skills and knowledge required to be successful on the item. This makes it possible to allocate each *PAT Vocabulary Skills* test item a score on the same scale used to measure student achievement. An item with a high scale score is more difficult for students to answer correctly than a question with a low scale score. It could generally be expected that a student is able to successfully respond to more items located below their scale score than above.

By referencing the difficulty of an item, or a group of items, and the proportion of correct responses by a student or within a group, it may be possible to identify particular items, or types of items, that have challenged students.

A score on the *PAT Vocabulary Skills* scale has no meaning on the *PAT Vocabulary* scale or any other PAT scale. The units of the scale have different meanings for each scale. This is because these units are calculated based on the range of student levels of achievement, which vary widely. The *PAT Vocabulary* scale measured only the skill of identifying synonyms, which is essentially 'one strand'. The *PAT Vocabulary Skills* scale measures a range of skills that are categorised into four strands with a total of nine sub-strands.

Achievement bands

While a scale score indicates a student's achievement level, and can be used to quantitatively track their growth, it is only in understanding what the number represents that teachers can successfully inform their practice to support student learning. For this reason, the PAT scale has been divided into achievement bands that include written descriptions of what students are able to do at that band (band description). A student scoring in a particular band can be expected to have some proficiency in that band and be progressively more proficient with the vocabulary skills outlined in lower bands.

Students in the same achievement band are operating at approximately the same achievement level within a learning area regardless of their school year level. Viewing student achievement in terms of achievement bands may assist teachers to group students of similar abilities. By referencing the PAT achievement band descriptions, teachers can understand the types of skills typical of students according to their PAT band.

A *PAT Vocabulary Skills* scale score of 110 could be considered to be at the upper end of achievement band 100–109 or at the lower end of achievement band 110–119. In cases like these, it is important to reference the descriptions of both achievement bands to understand the student's abilities.

The divisions of achievement bands were made based on theoretical definition of construct and empirical observation of the difficulty of the test items in the *PAT Vocabulary Skills* assessment. When the test items are ranked in order of difficulty, they can be interpreted as reflecting a vertical progression of required skills and knowledge. In describing a band, experts look at what skills and knowledge are evident in each band and write a description that gives a more holistic picture of that stage of development. In this respect, a band can be thought of as a description of one stage of development in the domain. Knowing at which stage a student's ability is located can help target learning for students performing at these different levels, to ensure their progression from one level to the next.

PAT Vocabulary Skills achievement band descriptions

150 and above	Categorise and order rare words based on abstract concepts Students understand, and identify definitions for, a wide range of rare vocabulary including literary words and vocabulary related to sophisticated, abstract concepts. They can differentiate fine shades of meaning in a group of words, for example by ordering words according to the degree of certainty.
140–149	Recognise, differentiate between, and infer the meaning of some rare words Students understand a range of rare words, including words that are more likely to be encountered in carefully written texts such as novels or technical reports than in speech, and words that have specialist or very precise meanings. Students can differentiate between the meanings of words with superficially similar meanings, and infer the meaning of some rare words.
130–139	Apply knowledge of uncommon words and some Latin and Greek roots Students understand many uncommon words relating to a wide range of contexts. Students identify Latin and Greek roots for some uncommon words, and differentiate the meanings of words with the same Latin or Greek roots but different affixes that may also be of Latin or Greek origins. They can use contextual clues from a short, dense literary passage to understand rare words.
120–129	Categorise and infer the meaning of uncommon words in a range of contexts Students understand a broad range of common and uncommon words and a few rare words in local contexts as well as some contexts outside of their day-to-day life. They understand, and can identify, the meanings of common root words and affixes, categorise uncommon words according to familiar concepts, and identify multiple meanings of common and some uncommon words.
110–119	Recognise and infer the meaning of uncommon words in everyday contexts Students understand a range of common and uncommon words in everyday contexts, which includes words encountered at school. They can identify meanings of parts of common words (eg affixes), and identify how a word can be understood differently when used in different contexts. Students draw on their wider vocabularies to select synonyms for, and from, a wider range of common and uncommon words; to select words to complete sentences; and, to identify multiple meanings of uncommon words.
100–109	Apply knowledge of common words and familiar prefixes Students understand familiar, common words and some uncommon words. They can sort some uncommon words into frequently used categories for these kinds of words, and identify multiple definitions of some common and uncommon words. They identify the different meanings some familiar root words can have when combined with a small range of common prefixes, and match prefixes to familiar or common words that create words of the opposite meaning (eg 'do' and 'undo').
90–99	Recognise and sort some common vocabulary in everyday contexts Students understand familiar, common words that are related to themselves, their everyday life at school and home. They can match definitions and synonyms to the words that they know; match common words to pictures; sort common and some uncommon words into frequently used categories for these kinds of words; and, order common words by degree when there are very clear distinctions between them.
89 and below	Recognise familiar vocabulary in familiar contexts Students understand vocabulary that is related to highly familiar contexts such as home, weekend activities and simple emotions. They correctly match words to everyday pictures in these contexts, and identify simple definitions for familiar words.

Reference groups

PAT Vocabulary Skills reference groups are available as a reference sample against which student achievement can be compared. They are composed of Australian students in Years 1 to 10 who completed *PAT Vocabulary Skills* assessments between July and December 2019.

The comparison between a student's scale score achievement and the reference group can be expressed as a percentile or stanine ranking.

Percentiles

The percentile rank of a score is the percentage of students who achieve less than that score. Percentiles are useful when measuring the performance of a student against the reference group for that year level. For example, a student with a percentile rank of 75th compared to the Year 3 reference group sample has a scale score that is higher than 75% of Australian Year 3 students in that group.

Stanines

Stanines are ranking scores from 1 to 9 derived from the Australian reference group percentiles. Stanines provide a simpler grouping of students with similar skills.

Stanine	Corresponding percentile ranks
9	96th and above
8	90th–95th
7	77th–89th
6	60th–76th
5	40th–59th
4	23rd–39th
3	11th–22nd
2	4th–10th
1	3rd and below



Appendixes

Appendix 1

Literature review: locating PAT Vocabulary Skills in the broader research context

The importance of vocabulary for comprehension

A rich vocabulary is essential in developing listening and reading comprehension from the earliest years (Graves, 2006; Hairrell, Rupley, & Simmons, 2011; National Reading Panel, 2000). Language-rich early years environments are critical. Preschool children demonstrate higher levels of literacy achievement in the following years when they have preschool teachers who actively develop students' language skills by modelling the use of more sophisticated vocabulary, engaging children actively in talk about books, and using more complex syntax themselves (Dickinson & Porche, 2011). Vocabulary appears to be more important than grammar or short-term memory in supporting the ability of four to five year-old children to make inferences (Silva & Cain, 2015). As early as second grade, children with larger vocabularies read words more accurately (Snow, Tabors, Nicholson, & Kurland, 1995), and even stronger relationships between rich vocabularies and good comprehension emerge in later years when students read more complex texts (National Early Literacy Panel, 2008; Storch and Whitehouse, 2002; Senechal & LeFevre, 2002).

Walker, Greenwood, Hart, and Carta (1994) found that children with poor language and vocabulary skills during the early years of school were the lowest achievers in reading and related literacy skills, and in language and vocabulary skills seven years later. Children who enter school with lower vocabulary scores tend to come from home backgrounds where they hear fewer different words per interaction, hear more commands rather than prompts and questions, and have less interaction with adults (Hart & Risley, 1995).

Having a broader vocabulary allows students to continue to improve their vocabulary by learning new words in context, and further develop their comprehension skills as they understand enough of the texts they hear or read to infer the meaning of confusing parts. Students with low levels of literacy struggle to learn new words in context because there are too many words they do not know, so there is little support in inferring meaning. This contributes to the Mathew effect identified by Stanovich (1986) as a downward spiral where early lags in literacy become magnified with reading development, so that when students read, those with rich vocabularies rapidly expand their vocabularies through successfully inferring the meaning of new words, while students with poor vocabularies show little vocabulary growth.

Vocabulary is more than knowing discrete words and their meanings. Additional conceptual levels of understanding and cognitive processes are involved in applying word knowledge to determine and express meaning. In listening and reading, new words, or new uses of familiar words, are frequently encountered. Coping with these new words and meanings requires developing cognitive strategies to understand these words in context. Rich vocabularies have breadth and depth. Breadth means that students know the meanings of many words, and depth means that they also have rich associations with, and between, the words they know. They are readily able to identify related words, differentiate the meaning of similar words and recognise where a word may have different meanings depending on the context.

Supporting a student's growth in vocabulary supports their educational progress. Students need to understand at least ninety-five per cent of what they read in order to continue to improve their reading comprehension skills. Once comprehension drops below ninety per cent, students no longer improve their comprehension skills through independent reading (Allington, 2012). Some students with good vocabularies may still have limited decoding skills or comprehension strategies.

Progression in vocabulary development

Understanding how vocabulary skills develop supports teachers to plan vocabulary instruction in a sensible, progressive and effective way. Two slightly different instructional methodologies and ways to categorise words are outlined here.

Beck, McKeown and Kucan (2013) separate vocabulary into three tiers. Words in tier one are familiar everyday words that are not conceptually difficult. They are encountered frequently and often, and so are necessary knowledge for language use. Tier two words are more complex, but are used regularly and across a variety of contexts, and so will need to be learned in order to continue to develop language skills. Tier three words are infrequently used, specific to particular contexts or topics, and are used more in written than spoken language.

Graves et al. (2014) propose a different approach, although they draw parallels to the tiers proposed by Beck et al. They first divide vocabulary into familiar and unfamiliar words, and then further categorise unfamiliar words into one of four categories relating to the relative importance of knowing the meaning of the word for understanding the text in which it appears. Ordering the categories by importance leads to them recommending pedagogical strategies for ensuring the more important words are explicitly and carefully taught, while the less important words receive less attention. Importance is decided within the context of the age and ability of the students, so the categories are not fixed, allowing for instructional planning to be responsive to the needs of the students.

Both of these approaches to teaching vocabulary take the frequency and complexity of words into account in their classifications. It is assumed that the simplest and most familiar words ought to be taught and mastered first, to form a foundation from which to build upwards and outwards. This is a traditional and common sense approach, but also one that appears to be effective. The differences between the approaches of Beck et al. (2013) and Graves et al. (2014) appear to be largely in the way that one decides what comes next, although there are more similarities than differences in how that is decided.

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Appendix 2

Trial design and assessment validity

A test is said to be valid if it measures what it was intended to measure. The *PAT Vocabulary Skills* tests are planned and constructed to assess the scope of vocabulary skills with a focus on both breadth and depth. The assessment helps teachers to identify students with limited vocabulary that is highly likely to be impeding their progress, as well as identifying students with good vocabularies who may not be utilising their skills effectively, or who may need more challenging work. In constructing the tests, care is taken to include a range of all appropriate characteristics to ensure that the breadth of students' abilities can be captured. All of the items are subjected to intensive scrutiny, review and revision by panels of experts.

All items are developed by a group of experienced test developers specialising in vocabulary skills, who review and panel the items until they are ready for trial. A rigorous process of quality checking, proofreading and formatting then takes place. The psychometric team provides a trial design based on the items (number, distribution of strand and proficiencies). To ensure the most valid and reliable psychometric data is made available, *PAT Vocabulary Skills* items were trialled in standalone trial test forms, with sets of items placed into different locations in multiple versions of a single form. Schools using any of ACER's online PAT assessments may opt for their students to participate in the PAT test trials. Data analysis is performed after trial by the psychometric team, with the Test Development Manager making final decisions about item performance and deletions. Each trial is designed to strengthen the *PAT Vocabulary Skills* construct, ensuring a spread of items along the PAT scale that meets the demands of strand and proficiency distribution.

The test calibration procedures identified items that also appeared to be measuring skills other than those measured by the majority of items. Items 'misfitting' in this way were not retained. The items retained for *PAT Vocabulary Skills* were shown to fit the Rasch measurement model satisfactorily. Items that were not able to discriminate between high and low performing students were not selected for *PAT Vocabulary Skills*. All selected items could be regarded as measuring a student's location on a single underlying continuum of vocabulary skills.

Appendix 3

PAT Vocabulary Skills item response format examples

These examples illustrate different item response formats used in *PAT Vocabulary Skills* assessments.

Simple multiple-choice

The dog is small.
Select another way of saying small.

big


black

little

wet

Drag-and-drop

Drag two words that describe this picture.



Complex multiple-choice

The words below can refer to things that you **eat** or things that you **wear**.
Select **Eat** or **Wear** for each word.

Word	Eat	Wear
jacket	<input type="radio"/>	<input type="radio"/>
rice	<input type="radio"/>	<input type="radio"/>
chocolate	<input type="radio"/>	<input type="radio"/>

Hotspot

Select the **sock**.



Cloze

Select the **ending** for each word.

The first one has been done for you.

helpful

wonder

friend

kind

