Beyond NAPLAN

Using reading data to improve students’ performance in higher-order questioning

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Contents

Scope of this paper ................................................................. 1
Relevant background ........................................................................... 1
  NAPLAN Reading test and minimum standards................................. 1
  A scan of the NAPLAN Reading test data ......................................... 2
  Question/stem form ................................................................. 2
  Facility rates ............................................................................. 3
  Error analysis ............................................................................ 3
  Responding to higher-order comprehension items ............................. 4
  The cognitive dimension ............................................................. 4
  A toolbox for handling analytical questions ...................................... 6
  Applying this strategy to a specific NAPLAN reading item ............... 7

Summary ...................................................................................... 9

Appendix 1 .................................................................................. 11
  Analytical Items in NAPLAN Reading test 2011–2013 ....................... 11

Appendix 2 .................................................................................. 12
  An approach to a NAPLAN Reading test item ................................... 12

Appendix 3 .................................................................................. 14
  Typical Year 9 Science text entry .................................................. 14

References ................................................................................. 15
Scope of this paper

An analysis of higher-order questioning involving identification of purpose and main idea in NAPLAN Reading tests 2011–2013 for Year 7 and Year 9 was completed, including the identification of the relationship between specific questions and NAPLAN minimum standards. Student performance for Queensland students was examined. On this basis, aspects of item construction, student error rates, error analysis and the particular cognitive demands required were considered. Suggested teaching strategies have been provided as a means of improving student performance on items of this type, improving students' ability to evaluate texts in the broader sphere of reading comprehension, and generally increasing the level of literacy proficiency.

Relevant background

The NAPLAN Reading test forms part of a suite of tests conducted annually in Australian states and territories for Years 3, 5, 7 & 9. The Australian Curriculum, Assessment and Reporting Authority (ACARA) is responsible for the National Assessment Program (NAP), of which NAPLAN is a part. The Curriculum and Assessment Authority (QCAA) administers NAPLAN in Queensland schools.

The NAPLAN Reading tests have typically consisted of a set of stimulus material covering a range of genres, including narrative texts, poetry, information and persuasive texts. Each stimulus, occupying a single page in a 'reading magazine', is accompanied by a set of items (between 5 and 7) in a separate booklet. Generally these items are multiple choice, with a very occasional item requiring a constructed response.

The Reading tests include a range of items, increasing in complexity from literal to lower-order inferential questions, and moving to higher-order questions of an analytical and evaluative form. Students' performances on these tests are measured at class, school, state and national levels, to inform teachers, schools and jurisdictions (state and federal) about literacy proficiency. Facility rates indicate the percentage of correct responses for an item, and these are used as a comparative tool for the various cohorts of students. By analysing the facility rates on the Reading test (and the other components of the NAPLAN testing program), it is possible to identify trends in student performance in particular types of items.

NAPLAN Reading test and minimum standards

As part of the National Assessment Program (NAP), a complete set of minimum standards for Reading, Language conventions and Numeracy has been described. With the introduction of NAPLAN testing nationally in 2008, minimum standards for each domain, including reading, were derived following analysis of actual NAPLAN test items.

For example, a minimum standard for a Year 9 student reading a complex information text is to: *identify the main purpose of a text or an element of a text*. In the 2013 Year 9 Reading test, Item 17 asked students: *What is the purpose of the highlighted final paragraph?*

What is striking about this and similar items is the strength of the relationship between the...
A scan of the NAPLAN Reading test data

The table in Appendix 1 identifies a range of higher-order questions in the Reading tests (2011–2013) in Year 7 and Year 9, together with state and national facility rates. The obvious features of this table are:

- the similarity in phrasing of item questions/stems
- the relatively low facility rates across items.

**Question/stem form**

The questions/stems are generally straightforward, and have been replicated both within the same test and across the three years of the testing program under consideration. The 2013 Year 9 Reading test, for instance, includes three items (17, 19, 29) in different units that require students to identify the purpose (or main purpose) in a particular paragraph (or paragraphs).

Though this is the most common form, it is interesting to consider the range of question types and the way language has been used to create higher level analytical or evaluative tasks. Considering the items identified in Appendix 1, the range includes:

- **Intentional** — *What is the purpose of the text/paragraph or highlighted paragraph?*
- **Thematic** — *What is the main idea/message/theme or underlying assumption?*
- **Countering** — *Which statement most directly undermines the main argument?*
- **Contrasting** — *What contrast is made in the text?*
- **Substantiating** — *The text is supported by the idea that:*

The vocabulary demands of these items appeared to be well within the grasp of students in Year 7 and Year 9, so it is unlikely that students found the actual wording of the task problematic. Rather, it appears to be the level of analytical/higher-order thinking required that creates a challenge for students. It could be plausibly argued that if students could make the connection between the stem and the particular purpose of the item being tested (e.g. substantiating or contrasting), they may be able to respond to the item more effectively and successfully.
Facility rates

Facility rates for these items are consistently lower than other items in the NAPLAN Reading tests (2011–2013). This data needs to be read in the context of whole-of-test construction, of course, given that items with a range of difficulty would/should be expected across a 40+ item test. Also, items identified in Appendix 1 are testing higher-order thinking and comprehension, and should prove more challenging to students than simpler literal items. Though these factors obviously impact on facility rates, it is worth noting that, when comparing performance of students on each of these items within the unit in which they appeared, six of the items had the lowest facility rates.

A contributing factor to these low facility rates is the significant number of omits. (The term omit refers to an item where a student provides no response.) The omit rate for these items was markedly higher, on average, than on other items: typically around 25% higher.

This raises the question of why, if the items are worded in a fairly repetitive/straightforward form across the tests, do many students elect not to even select a multiple-choice option, or write a short constructed response? The answer may lie in the lack of strategy to address analytical questions of this type. The structure of the multiple-choice options, and the cognitive demands required to unpack these, also appear to be significant factors influencing students’ unwillingness to attempt responses.

Error analysis

Data on students’ responses on these and other NAPLAN items is available through the SunLANDA software tool produced by the Queensland Curriculum and Assessment Authority. Error reasoning suggests some common pitfalls in the approach of students to higher-order questions around purpose and main idea, including:

- an inability to relate a specified element of the text to whole-of-text understandings
- not following lexical clues in a text relating to a central idea or purpose
- not recognising or acknowledging counter/contrasting elements when determining a central idea or purpose.
Responding to higher-order comprehension items

In framing the Years 3, 5, 7 Literacy reading test in Queensland schools, a forerunner to NAPLAN, item writers used as their basis the model of Sanders (1969), which described links between comprehension levels, questions, and the ‘expected’ behaviours of readers (QSA, 2004). In this model, questions are located on a hierarchy as indicated in Table 1 below.

**Table 1**

<table>
<thead>
<tr>
<th>Question type</th>
<th>The reader is asked to:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal</td>
<td></td>
</tr>
<tr>
<td>Recall</td>
<td>recognise or recall information</td>
</tr>
<tr>
<td>Translation</td>
<td>change information into a different form — it might involve</td>
</tr>
<tr>
<td></td>
<td>paraphrasing the ideas or restating them in terms or forms</td>
</tr>
<tr>
<td></td>
<td>other than those in the text</td>
</tr>
<tr>
<td>Inferential</td>
<td></td>
</tr>
<tr>
<td>Interpretation</td>
<td>identify the relationships among ideas, definitions, facts</td>
</tr>
<tr>
<td></td>
<td>and values — these would involve such relationships as</td>
</tr>
<tr>
<td></td>
<td>comparisons, cause and effect — they involve a minimum of</td>
</tr>
<tr>
<td></td>
<td>higher-order thinking as the reader/learner needs only to</td>
</tr>
<tr>
<td></td>
<td>respond to and manipulate ideas in the text.</td>
</tr>
<tr>
<td>Higher-order</td>
<td></td>
</tr>
<tr>
<td>inferential</td>
<td>Application solve real-life problems by extrapolating what</td>
</tr>
<tr>
<td></td>
<td>it is in the text — readers/learners need to combine ideas</td>
</tr>
<tr>
<td></td>
<td>from the text with prior knowledge</td>
</tr>
<tr>
<td>Logical Analysis</td>
<td>analyse and judge the quality of the logic inherent in the</td>
</tr>
<tr>
<td></td>
<td>text — readers/learners might, for example, identify</td>
</tr>
<tr>
<td></td>
<td>fallacies or particular points of view represented in a text</td>
</tr>
<tr>
<td>Creative</td>
<td></td>
</tr>
<tr>
<td>Synthesis</td>
<td>respond to a problem or idea with original and creative</td>
</tr>
<tr>
<td></td>
<td>thinking</td>
</tr>
<tr>
<td>Evaluation</td>
<td>make judgments with respect to specific criteria</td>
</tr>
</tbody>
</table>

On this hierarchy (Table 1), evaluation is clearly determined to be in the higher order of reasoning. That is not to say, however, that evaluative questions are always the most challenging. Nor could it be said that questions only ever address one of these categories. For instance, 2011 Year 9 item 43 required students to determine *This text is supported by the idea that* … Elements of synthesis and evaluation are evident here.

**The cognitive dimension**

What is clear is that readers need to apply certain types of cognitive comprehension strategies to elicit responses to these types of test items, or to the general reading demands they face.

One such cognitive demand relates to the form and vocabulary of multiple-choice options. While questions are framed directly (*What is the purpose …?*), the options are often quite abstract versions of meanings within the text, frequently in a nominalised form. In the item (right), the key, *to give a new perspective on a common opinion*, and the strongest distracter, *to argue for the protection of weeds*, are abstracted representations of ideas from within the actual text. The reader is required to hold on to multiple meanings from the text, and measure these against the more abstract options.

What is the main purpose of the text?
- to describe the joys of gardening
- to argue for the protection of weeds
- to educate readers about the biology of plants
- to give a new perspective on a common opinion
A question raised by this cognitive processing is how best to sequence the approach to the question. Would students, already loaded with the stimulus material (and the question), be better to arrive at a view on purpose of a text/paragraph on their own, before applying this distilled view to the options available? Many students appear to use the reverse strategy of being familiar with question and options before seeking an answer from the stimulus. Could this be to their detriment, given the often complex form of the options? In reviewing the behaviour of U.S. college students in undertaking multiple-choice tests, Farr et al. (1990) found that the strategies used by students relied heavily on moving from question to text, rather than attempting to reach an overall understanding of the text or stimulus first. In the 2012 Year 9 NAPLAN Reading test, Item 42 asked: Which statement most directly undermines the main argument of the text? Using a strategy of assimilating question and options prior to identifying a counter to the ‘main argument’ in the stimulus could prove very challenging for readers. The alternative approach of determining ‘main argument’ in the first place, and then seeking its rebuttal from the options seems a less complex and more realisable strategy.

Another consideration relates to the appropriate selection of comprehension strategies by students. Since many other NAPLAN Reading test items require students to locate specific details from the stimulus text, students may simply apply the same strategies to the different and generally more challenging analytical questions identified in Appendix 1. They may seek out a specific element from the text when the main idea may only be inferred, or may require an additional context provided by the reader. If no direct ‘answer’ can be located in the text, students may simply guess at a multiple choice option or produce an ill-considered constructed response.

Reading comprehension is inherently a complex process. Snowling et al. (2009) describe the movement in comprehension skills from a local coherence (words, meanings, sentences, integration of meanings) to a more global coherence at a whole-of-text level. Here readers need to make sense of and connect the localised meanings, draw inferences about causation, character, information, time, etc., and view these within their own contextual frames of reference and prior knowledge. Put simply, they are required to make a global judgment. Lexical (the vocabulary used) and textual (grammatical) cohesion support meaning-making across the text.

Higher-order questioning of texts relates strongly to this notion of global coherence, and it is in this area that explicit reading strategies need to be directed if students’ capacities to evaluate aspects of texts are to be further developed.

Harvey and Goudvis (2007) maintain that the process of determining the main idea or purpose in a text is often dependent on what the reader’s purpose is for reading it. In other words, there may be many purposes of a text. In authentic reading tasks, this could be a very important consideration. It could take into account elements of critical literacy, such as the positioning of writer and reader and the interrelationship that may develop, any significant prior knowledge of a reader, what needs to be remembered, etc. In more standardised assessment tasks, however, a reader’s purpose is essentially pre-determined, i.e. a successful answer to the question by constructing a suitable response, or a correct selection of a multiple-choice option. Nevertheless, the greater the level of engagement of the reader in the stimulus material of a test (such as in a NAPLAN Reading unit), the more likely some level of global coherence could emerge. Thus the more authentic the stimulus material is (in testing materials and in general classroom reading activity) the higher the likely level of student engagement and understanding. Hare et al. (1989) found that students’ ‘main idea analysis’ was strengthened with the use of ‘naturally occurring texts’, and more significantly, when there is some dissonance between the contexts of learning and testing, readers are more likely to ‘… construct idiosyncratic main ideas.’ (p. 87)
On this point, Shanahan (2011) challenges the whole notion of the validity of different types of questions in differentiating student performance in reading comprehension. He maintains strongly that it is the text itself, and its level of complexity, that accounts for the level of a student’s performance in reading comprehension tests. Thus students may be ‘turned off’ by more difficult or unfamiliar stimulus material and may subsequently answer only a small number of items. Undoubtedly, this pattern of student response is plausible, but the proposition does not seem to be supported by the results on items identified in Appendix 1. In these items, student performance in analytical items was differentiated from other items in the same unit and based on the same stimulus.

The reading process extends far beyond simply decoding words on the page, and as students travel through schooling, complexity increases in terms of the nature of what is read, as well as the skills students need to comprehend, infer, analyse and evaluate this reading material. In these terms, the cognitive dimension (Schoenbach et al. 2012) is crucial. This Reading Apprenticeship Framework explores how effective and explicit teaching strategies can improve reading outcomes in secondary interdisciplinary classrooms in the United States.

**A toolbox for handling analytical questions**

Schoenbach et al. advocate for the development of a reader’s toolbox, containing a set of skills that can be applied to reading activities so that the reading comprehension process becomes more ordered and realisable. What would need to be included in such a toolbox to better equip students in their responses to analytical questions such as those seeking the purpose or main idea of a text?

**Consider these few suggestions**

1. **Determine what’s important**

Harvey and Goudvis (2007) suggest one strategy that appears tailored to these higher-order questions. The strategy has been applied to one item from the 2013 NAPLAN Reading test (See Appendix 2). Essentially, the strategy works as follows:

- Firstly read the text, identifying any important information, including visual or typographical features. This may involve making margin notes.
- **Sift and sort** textual clues, within the contextual knowledge of the subject.
- **Think deeply** about the information, and ask questions of it.
- Understand what **you** think is important, and what **the writer** may want you to think is important. Balance these two perspectives. This could often involve re-reading.
- Construct a view of the **purpose** of the text (or segment) and be able to articulate this view.

Once done, if this is in a testing environment, the view can be applied to the multiple-choice options presented or to the construction of a suitable response. For some, this is not a linear process. The reader could be constantly shifting between text, question and options re-evaluating and re-testing thinking. However, we should consider the earlier point regarding cognitive sequencing, however. i.e. Would it be a wiser approach by readers to come to a clear position on **purpose or main idea** before scanning the multiple-choice options?
If the question is specifically requiring the reader to identify the writer’s **purpose**, then an understanding of the **whole** text is implicit, even if the question targets a particular paragraph or segment of text. The context is all important. Students may believe that an answer would reside in the designated segment of text, when in fact the writer of the text would have made a particular choice about purpose with the whole of text in mind.

For instance, Year 9, 2013, item 19, asked students: **What is the purpose of the first two paragraphs?**

Students require a whole-of-text understanding to answer this question correctly. In fact, students who focused solely on a primary reading of the first two paragraphs may have actually been influenced towards the item distracters, rather than the key response.

### Applying this strategy to a specific NAPLAN reading item

**The NAPLAN reading task**

A copy of the unit stimulus, and the item with multiple-choice options, has been provided in Appendix 2.

- This is the first item in the unit *Weeds*, but students should have read the text before attempting the question. If the item appeared later in the set, students should at least re-read or skim the text again.

- Students should read the question. **Main purpose** suggests that there might be other minor purposes or meanings. They should recognise that identifying a purpose will require some analysis of the text, not just locating a piece of information.

- A visual scan reveals the that title (in large font), colours and visuals that are suggestive of warmth/favourable opinion.

- **Sift and sort** what is important.
  - The opening and closing statements indicate a coherence of positive beliefs (and feelings) about weeds.
  - As the reader scans the text, establishing points of **local coherence**, he/she identifies other positive statements made by the writer about weeds. *That’s another reason I love them: they’re so tough*. In fact, the lexical cohesion is extensive, *(love, 6 times, like, beautiful, smart, tough, hardy)*. The student could make margin entries, beside the stimulus, of key statements/vocabulary.
  - The second and third paragraphs indicate that the writer’s Dad disagrees on the subject of weeds. His is the more common view, which most likely links with the reader’s prior knowledge or ideas. So the reader has to evaluate and balance these two positions.
  - The text gradually becomes **globally coherent** to the reader. This may require re-reading of segments of the text. The reader needs to think deeply about those things of significance to the question. The reader should reaffirm that the opening and closing of the text express a positive attitude towards weeds, even though this may be at odds with the more conventional and traditional view held by the father. In a sense, the writer is challenging that traditional view, but not vehemently.

- The reader can now measure his/her view of the writer’s purpose against the options provided.

**Teaching tip**

Remind students that with **purpose** questions that target a single paragraph or segment of text, an awareness of the entire text is still required.
Armed with this sense of global coherence, he/she should be directed to option D, the key. Options A and C bear no connection with the writer’s purpose, so derived. Option B may require more fine-grained scrutiny, but reference to the son pulling out weeds in paragraph 2, and the overall tone of acceptance of the alternative and conventional view towards weeds, rules out this option.

• Whilst this process may sound arduous, this is a written description of a series of cognitive steps that continuously overlap. In practice, this can be achieved quickly, with the added benefit that pre-read distracters are not interfering with the reader’s intrinsic identification of main purpose.

• The other important consideration is that this strategy is inappropriate for some other questions that may require a simple match, perhaps, or a single straightforward inference based on one textual element.

• Finally, NAPLAN stimulus texts are sometimes cross-genre, and conceivably, students could go down the wrong semantic track entirely. For instance, the Weeds text could be interpreted as some type of personal recount about father and son. If a main purpose is identified within this frame of thought, there would be no options to match. Even so, the reader could quickly re-evaluate the task, bearing in mind that he/she would already have the foundations of a textual understanding in place.

Applying the same strategy to an authentic reading task

The classroom reading task

How could this strategy be applied to a classroom level activity? A copy of a typical Year 9 Science text reading task is provided in Appendix 3. Annotations indicate how the text, and its textual features, can be read by students to identify the main idea. In so doing, students will also engage with the semantic and syntactic elements of the text in determining how the text works overall.

2. Being test-wise

As in all of these strategies, the teacher plays a crucial role. Because there exists such a strong relationship between the minimum standards and the phrasing of questions in the NAPLAN Reading tests, teachers could incorporate these types of questions more seamlessly into their teaching programs. This could be in written tasks, but would also suit oral questioning in class/group. Questions asking for the identification of purpose, theme, tone etc. are ideal for class discussion, involving high levels of metalinguistic and metacognitive experience. If the teacher is also able to unpack the reasoning behind answering these types of questions with the class, a more authentic model for students to emulate will be provided. Students can then more readily make the association between the regular curriculum and the NAPLAN test environment.

It could also prove useful to consider the variant question forms testing higher-order inference, analysis and evaluation. Being asked to contrast, counter or substantiate will help students appreciate the complexity of the analysis required. Familiarising students with these more unorthodox forms could assist their capacity to approach higher-order reading tasks in the future.

Lastly, students should be reminded, within time constraints, to annotate margins of stimulus texts. These notes can provide useful markers in determining the global coherence of a text.
Summary

• An analysis of student responses in the NAPLAN Reading tests (2011–2013) indicates that many students in Year 7 and Year 9 were challenged by a set of questions requiring higher-order inference, analysis or evaluation. This may have been realised by the omission of a response, an inability to more globally assess text purpose, or some confusion in identifying how item distracters represented certain parallels to the text.

• There exists a very high relationship between ACARA’s minimum standards and the test item construction for analytical items in the Reading tests.

• Undoubtedly, these questions (in standardised testing and elsewhere) are problematic for students across the grade levels.

• There appear to be a specific set of reading strategies that need to be applied to higher-order questioning.

• Students need to be explicitly taught these strategies. Some have been identified in this paper (see pp5–7).

• Teachers should encourage and model metacognitive and metalinguistic approaches to reading comprehension.

• Students can also become more test-wise in their handling of higher-order inference, analytical and evaluative questions on NAPLAN and other testing programs.
### Appendix 1

#### Analytical Items in NAPLAN Reading test 2011–2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Level</th>
<th>Item</th>
<th>Unit</th>
<th>Stem</th>
<th>Facility Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Qld</td>
</tr>
<tr>
<td>2013</td>
<td>9</td>
<td>17</td>
<td>Malaria’s Ancient Mask</td>
<td>What is the purpose of the highlighted final paragraph?</td>
<td>58.6</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>19</td>
<td>Encounter in Castle Estondrake</td>
<td>What is the main purpose of the first two paragraphs?</td>
<td>29.8</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>29</td>
<td>Being a Vegetarian</td>
<td>What is the purpose of paragraph 5?</td>
<td>29.4</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>31</td>
<td>Being a Vegetarian</td>
<td>Which word best describes the writer’s tone?</td>
<td>73.5</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>20</td>
<td>Weeds</td>
<td>What is the main purpose of the text?</td>
<td>57.8</td>
</tr>
<tr>
<td>2012</td>
<td>9</td>
<td>29</td>
<td>‘Let them Eat cake!’</td>
<td>What is the text’s main message about Marie Antoinette?</td>
<td>50.6</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>42</td>
<td>The 3D dinosaurs</td>
<td>Which statement most directly undermines the main argument of the text?</td>
<td>29.7</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>3</td>
<td>Bike sheds</td>
<td>The main purpose of the newspaper article is to report.</td>
<td>69.8</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>12</td>
<td>Chooky dancers go global</td>
<td>What contrast is made in the text?</td>
<td>43</td>
</tr>
<tr>
<td>2011</td>
<td>9</td>
<td>37</td>
<td>Where on Earth are you?</td>
<td>In this text, the underlying assumption is that:</td>
<td>29.8</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>43</td>
<td>The living night</td>
<td>This text is supported by the idea that:</td>
<td>39.4</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>48</td>
<td>Inventing daylight saving</td>
<td>What is the main idea presented in the final paragraph?</td>
<td>7.4</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>34</td>
<td>Comets</td>
<td>The main purpose of the last paragraph is to provide:</td>
<td>72.8</td>
</tr>
</tbody>
</table>

Three items, 2013 Year 9 Item 31, 2012 Year 7 Item 3, 2011 Year 7 Item 34, did have significantly higher facility rates than others identified in Appendix 1. This could be accounted for by:

- the relatively straightforward nature of the stimulus material for these units
- lower level inferential demands of these items compared to other items in this table
- less abstraction in the language and semantics of the options provided.
Appendix 2

An approach to a NAPLAN Reading test item

I love weeds. I love their bright, spidery-green leaves. I love that they don’t ask permission to grow. I love that they don’t care about neatness or position — they’ll grow in, on, out of, beneath or between anything; in places other plants seem to fear or scorn. I think the weeds in my Dad’s garden are the most beautiful plants there.

My Dad would disagree. He pulls out weeds at every opportunity. No — let me rephrase that: he makes me pull them out at every opportunity. That’s my job at home. I don’t mind too much. The weeds don’t mind either. They grow back almost as fast as I can yank them out. If I can yank them out. That’s another reason I love them: they’re so tough. Or weak, depending on how you look at it. They either cling relentlessly to the earth, or snap off just above the ground so that their roots are no longer accessible. Very smart. And boy, do they know how to protect themselves, hiding amongst the tangled stems and roots of bigger plants so that even the most determined hands can’t squeeze in far enough to grab them. It can take several hours to do my job. If I didn’t admire weeds so much, I’d detest them.

I haven’t told my Dad that I like them, of course. He’d say something like, ‘Weeds are the vermin of the plant world, son; a rash on Nature’s backside.’ But I remember him once telling me that ‘A weed is just a plant you don’t want’. So I guess, to me, weeds are not weeds at all. They’re hardy little battlers who have to outsmart every other plant, because they’re the plant no-one wants. How could I not love that?
Things to consider as a reader:

- Unorthodox form — hybrid text
- Conversational tone
- Writer personifies ‘weeds’
- Counter positions — father and son
- Emotive language
  - *I love weeds* (son)
  - *a rash on Nature’s backside* (father)

Year 7, 2013 Item 20

What is the main purpose of the text?

- [ ] to describe the joys of gardening
- [ ] to argue for the protection of weeds
- [ ] to educate readers about the biology of plants
- [ ] to give a new perspective on a common opinion
Appendix 3

Typical Year 9 Science text entry

How to identify the main idea

Scanning text for clues
- Bold type introduction
- Bold (keystone species & ecological footprint
- Graph
Suggests themes of sustainable living,
Australian focus, scientific process.

Key points: the local coherence
- Opening sentence (...protect rather than exploit...)
- Lessons from indigenous cultures (para. 1)
- Research into keystone species (para. 2)
- Ecological Footprinting & Aust. (para.3)
- Closing sentence (...Australia needs to change how we live...)

Sustainable living for humans means acting in a way that maintains the living conditions of our environment. It involves careful use of resources so that they do not run out, and ensuring that natural ecosystems that keep us alive are not damaged by our actions.

The idea that we should protect our environment rather than just exploit it is fairly new in European and western civilisations. In the past, few people cared or recognised that the environment was being damaged. Only recently have scientists realised that some civilisations such as Australian Aboriginals and African Bushmen had the balance right between protecting and using the environment.

One recent discovery of ecologists is that there are keystone species that are critical to the survival of the whole ecosystem. For example, earthworms enrich the soil and enable plants to grow, and so support all the other organisms. If earthworms were to disappear, the ecosystem would be in danger of collapsing. Research into keystone species is essential if we are to understand how to better manage ecosystems.

Another recent idea for measuring sustainable living is ecological footprint (or eco footprint) analysis. The ecological footprint of a population is the area of land and water required to supply the resources needed for survival and to cope with the wastes produced. As the graph shows, the areas of land needed to support each Australian is about 7.5 hectares. The world average is about 2.2 hectares. Ecologists have suggested that Australians need to change how we live, to reduce our ecological footprint to about 2 hectares.

Moving to a global coherence
- Sustainability is a relatively new but important concept
- The study of ecology can assist us in facing the living conditions of our environment
- Australians may face particular problems of sustainability

So: The main idea might be something like: Australians need to live more sustainably and the study of ecology will provide important lessons in meeting this challenge.
References

12. The QCAA would also like to gratefully acknowledge Pearson Australia for permission to use the following text: Rickard, Greg et al. 2011, Pearson Science 9 Student Book p.295.