



NAPLAN Online 2014 Development Study: Cognitive interviews – Spelling

FINAL REPORT

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Report
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Background

This study is part of a series of projects conducted by the Australian Curriculum Assessment and Reporting Authority (ACARA) on the online delivery of ACARA’s assessment programs.

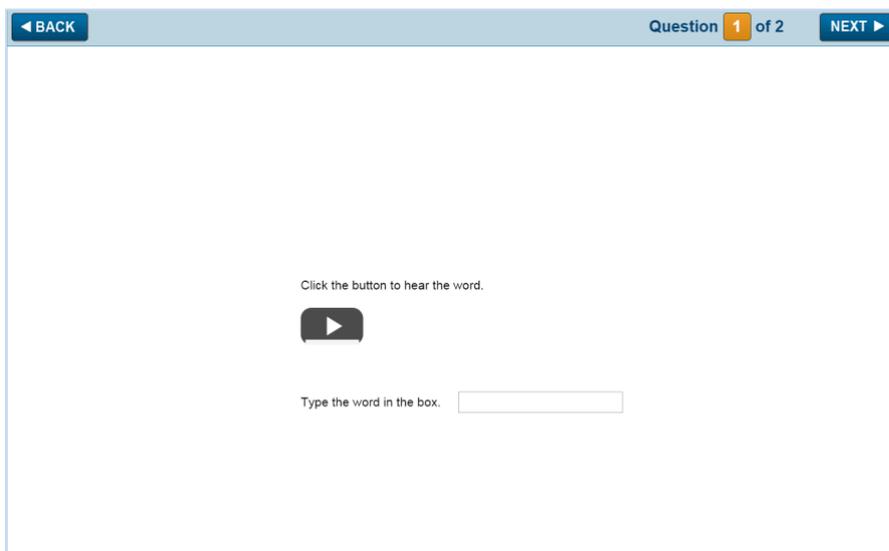
In this study, Educational Assessment Australia (EAA) was commissioned to investigate the cognitive and behavioural engagement of students with NAPLAN Online Spelling tests and items. In particular, interviewers were to observe students’ engagement with the audio-delivered component of the test and the impact of engagement on performance.

The online delivery of Spelling

At each year level, all students who took the online Spelling test encountered the same set of 40 items. Each test consisted of 24 dictated words, followed by 16 proofreading items in which the target word was embedded in a short written sentence. Some of these items indicated (by underlining) the incorrectly spelled word (Mistake Identified [MI]) and some did not (Mistake Not Identified [MNI]). The MI and MNI item types are familiar to students from paper-and-pencil NAPLAN tests, but the dictated words were a feature introduced in this online delivery format. The predicted facility rates of items ranged from 100% to 20% for dictated words and 95% to 10% for proofreading items. Ten shared items linked adjoining year levels.

The dictated items were delivered through individual sound files presented at the student’s own pace. The student pressed an arrow to hear each sound file. The student heard the instruction, *Spell X*, which was followed by the word being used in a short contextual sentence supporting its meaning, and then the word was repeated. Students were able to listen to the file as many times as they wanted before typing their answer into an on-screen response box.

Figure 1: Sound file screen



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At the end of the dictated words, students encountered a holding screen finalising this section of the test. After pressing **Next** on this screen, students were not able to return to their dictated responses. This strategy was suggested by the test development agency as a way of testing extremely simple words in dictation (e.g., said, day, man, boy) that were likely to appear in the wording of items in the proofreading section of the test. By finalising dictation, that potential for dependency was avoided.

The 16 MI and MNI items were then presented to students. Unlike the paper-and-pencil NAPLAN test, these two item types were mixed together, so each carried the appropriate instruction for its type.

Figure 2: Mistake Identified item

The screenshot shows a digital interface for a spelling test. At the top, there is a header bar with 'TIME REMAINING: 01 04' (Hours: 01, Mins: 04) on the left, 'Question 25 of 40' in the center, and a 'NEXT ►' button on the right. Below the header, the main content area contains the following text: 'The spelling mistake in this sentence has been underlined. Write the correct spelling of the underlined word in the box.' Below this, a sentence reads 'The force of gravitty keeps the moon in its orbit.' followed by a rectangular input box.

Figure 3: Mistake Not Identified item

The screenshot shows a digital interface for a spelling test. At the top, there is a header bar with '◀ BACK' on the left, 'TIME REMAINING: 01 03' (Hours: 01, Mins: 03) in the center, 'Question 35 of 40' on the right, and a 'NEXT ►' button on the far right. Below the header, the main content area contains the following text: 'There is one spelling mistake in this sentence. Write the correct spelling of the word in the box.' Below this, a sentence reads 'Research has revealed that adolescents have markedly different sleep patterns from adults, leading some schools to consider starting classes later in the day.' followed by a rectangular input box.

Methodology

Protocol development

The interview protocol was devised to focus on the interrelated themes of:

- Engagement
- The audio-delivered component of the test
- The computer-based test experience
- Cognitive behaviours associated with spelling

The investigation of these themes occurred by using three methods:

- Concurrent observation (CO): observing student behaviour during the test
- A guided concurrent think-aloud (CTA): asking students to ‘think aloud’ while answering an item
- Retrospective interview (RI): asking students questions about items in an interview that is held after the test is complete

The protocol is presented in Appendix 1. The following describes key decisions and actions in each interview phase.

Phase 2: Taking the test – Dictated spelling

The interviewer confirmed students’ ability to play and hear the audio files and to adjust the volume with the two practice questions.

Students were given the opportunity to listen to dictated items with and without headphones.

After testing the protocol in a mock interview, it was decided to interview students reactively in the dictated section of the test, exploring interesting behaviours as they occurred, rather than designating specific items to focus on.

All student responses were recorded on the interview sheets.

Correct and incorrect words were written down so students did not discern any pattern in the recording of their answers.

Students were asked to interpret the holding screen instructions at the end of the dictated items.

Phase 2: Taking the test – Proofreading

Students were asked to interpret the instructions for both MI and MNI items in the proofreading section when those different item types were first encountered.

Four MNI items were designated for a hybrid concurrent think-aloud interview. Students were asked what the sentence meant, how familiar the vocabulary was, how they chose the word that contained the mistake, and if other words distracted them. They were asked to describe as best as they could how they arrived at the spelling they submitted as their answer.

Phase 3: Retrospective interview

At the end of the test students were asked for overall impressions of the test, how it compared to the paper-and-pencil NAPLAN test, their response to the online delivery (especially the dictated section) and their suggestions for improvement. Additionally, the retrospective interview offered an opportunity to explore students' insights into their own cognitive processes.

Sample

The Spelling interviews took place in NSW independently from the main Spelling trial, which was conducted in South Australia.

Schools were selected by ACARA in consultation with EAA. All schools participating were independent schools. Four schools were coeducational, and two were single-sex schools, one a boys school and one a girls school. Forty per cent of the students interviewed were male and sixty per cent were female. Forty-five per cent were from metropolitan schools and sixty-five per cent from regional schools (see Appendix 2).

Computer use

At the start of the test students were asked three questions about their familiarity with computers. Their answers are in Appendix 3.

Student responses indicate that most of them have regular exposure to computers or tablets, either at home or at school. Thirty-three of thirty-eight students use computers most/some days at school and thirty-five of thirty-eight use computers at home either every day or sometimes.

The greatest variation was in mobile phone usage, with as many students saying their usage was not often or never as those saying they used a touch-screen mobile phone daily or sometimes.

Unsurprisingly, regular computer and mobile phone use increases with student age.

Findings

Students' recorded behaviours and responses were analysed across the following six themes:

- Engagement
- Reaction to dictation (technical and personal)
- Beliefs about dictation and proofreading
- Computer-based test experience (CBTE)
- Perception of difficulty
- Cognitive processes associated with spelling

Engagement

Students report they are not highly engaged by spelling tests. They see them as a means to an end. There is not the same scope for engagement through interesting content as there is in Reading. In the report on the cognitive interviews conducted for the online Reading test in 2013, it was noted: 'The main determiner of student interest and engagement seems to be the subject matter and text-type of the individual texts themselves. Subject matter that a student liked was most likely to have been rated as interesting, regardless of absolute difficulty and difficulty relative to the student's ability level.'¹ In this Spelling study students believe that the important characteristic should be that the test is clear, fair and able to be completed easily and quickly.

Many students reported the test as more engaging than paper-and-pencil NAPLAN tests simply because it is on a computer. The novelty and the interactivity of the computer delivery *made it more engaging and less stressful* (Y9). Several students referred to the lack of stress taking this computer delivered test as opposed to their response to the 'higher stakes' paper-and-pencil test.

It's more engaging on a computer. I find paper tests more stressful. This is easier to zoom through, more relaxed, you can be as speedy as you like. I like that the test is self-paced. (Y7)

There was a very positive response to dictation as a significant element of this test: [In comparison to paper-and-pencil NAPLAN] *Here you can listen to the word and listening helps.* (Y3)

An NESB student who struggled with English spelling observed: *I enjoy the test much more; because it's talking to me I think I can get more right.* (Y5)

I liked this one better. I liked listening to the words rather than reading and writing. I like seeing the words one at a time, not all on the same page. It makes it easier to work through. I think I got more right on this test than NAPLAN. I liked doing this. (Y5)

I found that the voice kept me more interested. (Y9)

Most students who expressed an opinion liked seeing the items one at a time:

¹ NAPLAN Online Tailored Test Design August 2013 Cognitive Interviews – Numeracy and Reading Part 2: Findings for Reading, p. 25.

I preferred seeing the items one at a time. You're not distracted by the other items. (Y5)

I'd rather see it [one at a time] than seeing it all at once and thinking how hard it is. (Y5)

It's better just seeing one item at a time. It's easier and not as nerve wracking as going 'Oh look at all the mountain of work in front of me'. (Y9)

But a Year 7 student commented: *On paper you get an overview of the test, how much you have to do.*

Only a couple of very competent spellers referred to positive engagement associated with difficulty. For the majority, taking a spelling test was a task to be done without particular engagement.

I usually like a challenge, but not in English spelling and stuff like that. (Y7)

I prefer a spelling test to be easy, sometimes I like a challenge, say in Maths, but not here. (Y9)

As the test proceeded, some weaker spellers exhibited the lack of engagement through yawning, fidgeting and gazing around. These behaviours seemed linked to the increasing difficulty of the items.

Reaction to dictation

For each dictation item, a context sentence was written to support students' recognition of the target word using age-appropriate vocabulary. Special consideration was given to the way the context sentences sounded when read aloud so that students could clearly hear the pronunciation of the entire target word, particularly when it began or ended with a vowel sound. The correct Australian pronunciation of each word was determined by consulting the Macquarie Dictionary. Where two different pronunciations were given the first listed was used. When the pronunciations of a word differed significantly, the word was removed from the pool of target words. The sound files were recorded by a female member of the EAA team, who it was felt had a fairly neutral Australian accent and who had experience as a teacher delivering oral spelling tests in a classroom situation.

Dictation was widely perceived by students to be an excellent way of assessing spelling words.

It attracted descriptions such as *fair, pure and more real*.

I think this test was the same concept [as paper-and-pencil NAPLAN] just a different format because you got to hear the words instead of see them. If you hear, it's more pure. (Y9)

One important element of this 'purity' is that students believed that the person dictating pronounced the word correctly, therefore they did not have to rely on their own knowledge of the word and how it is said. Students trusted the dictator. This provided, in their minds, greater equity than proofreading.

Everyone hears the same thing. (Y3)

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You can't hear the words on paper, so this is better. (Y5)

You hear the word said properly, you don't have to guess what it sounds like. (Y3)

It's better for people who are not good readers. (Y9)

I think it's very good for people with an ESL background because they can listen to it as many times as they like and it's very clear. (Y9)

The dictation voice was judged as clear, neutral and easy to hear and listen to. One student thought the voice was computer generated. Most students thought it was clearer with headphones than without and many commented that with a room full of students that would be the way it would have to be delivered. There was some reference to slight static or background noise but no student felt it impeded hearing the words. This seemed to be an initial reaction that soon settled.

It was pretty good. At first the sound was a bit muffled but I soon got used to it and it was fine. (Y7)

Some students commented that they liked being able to replay the dictation to be sure of the target word. Younger students in particular used this feature to re-hear softer sounds such as initial s in the words *said*, *sea* and *soil*. Another word which was listened to carefully was *chewed* in year 3, which several students heard as *tude*. This was confusing because they could not recognise it as a word they knew, until they listened to the context sentence which made the meaning, and therefore the word, clear.

In terms of the oral delivery of spelling words, the only word that aroused comment was *sanctuary* in Year 9 where the pronunciation between the three times the word was said varied slightly. Students either did not know the word (and the pronunciation could mislead, some thinking the person dictating was saying *century*) or said they knew the word but the pronunciation was inconsistent. However, this discussion mainly occurred after prompting rather than spontaneously. There were no other comments associated with pronunciation or accent reported during the study.

Students soon settled into the rhythm of playing and listening to the sound files without comment. The only change consistently suggested was to have less of a gap at the beginning of the sound file (currently 2 seconds after the play arrow is selected).

It started with silence, that was irritating. (Y3)

The dictation was good although the gap at the beginning was a bit annoying. (Y9)

Leave less of a gap between when the word starts. (Y7)

Dictation and proofreading

Dictation

Most students reported that as soon as they recognised a word, they switched straight into their own aural version of the word. If they did not recognise the word, they listened on and the reader's pronunciation of the word and the sentence context became more significant.

I more recognised the word, than relying on the pronunciation. (Y9)

I relied on the pronunciation if I didn't know the word, like herbivorous and solemn. (Y9)

I didn't find the pronunciation helped in spelling the word, but it might for some harder words. (Y9)

I recognised the word. In the sentence I listened to how she said it in case there was anything. (Y9)

Many students only heard the word once before they started writing their response. The only consistent exceptions were homophones (ate and sea in Y3, new and weather in Y5, bruise in Y7, patience in Y9) where students recognised they had to listen to identify which particular word they were being asked to spell.

It's good to have [the sentence] because some words sound the same but have different ways of spelling them like homophones and it helps you know which word it is. (Y5)

As the test proceeded, many students developed the practice of stopping the sound file early because they were confident to start.

A number of students expressed the opinion that they would do better on dictated items than proofreading items.

Some student reflections about the dictated element of the test included:

I would probably spell a word better when it's dictated. Then you know it's said correctly, and how it's used in a sentence. (Y7)

I prefer the dictated section because you had someone reading it to you, you didn't rely just on yourself. (Y9)

I definitely prefer dictation. I can understand the word easier when someone says it. I can get a thought in my head of how to write it. I can picture it better. I was quicker in that part. (Y7)

I prefer dictation, hearing the word helped to spell it. It's annoying seeing the misspellings. (Y9)

I would expect to do better on the dictation part. It is much easier than reading the words. It would probably be easier if it was all dictation. (Y9)

The dictation words were easier to spell because I had an idea of how the word was said. (Y9)

Two very poor Y9 spellers preferred dictation but altruistically believed the mix of item types means the full range of abilities is catered for.

I reckon the mix of items is good. It really tests where you are at. If they were all underlined there would be a lot more of a success rate. [The MNI] sorts out how good you are at spelling. (Y9)

The dictation words were easier to spell because I had an idea of how the word was said. But the mix of items is fair, it gives everyone a chance to show what they can do. (Y9)

Students' recommendation

In light of the endorsement for hearing the words said, some students suggested they would also like to have the option of being able to hear the sentences in the proofreading section read to them.

Proofreading

Despite its widespread endorsement, dictation was not necessarily seen by students as the only way spelling words should be assessed.

Probing revealed that students do not pay much attention to the carefully constructed MNI sentences, because they are on a 'find and correct' mission. Even very good readers and spellers did not bother about meaning beyond having a broad concept of what a sentence is talking about.

It was observed that fairly simple words can trip students up if they are unfamiliar, examples being *proved, markedly, consulted, foal*.

Words students do not know can be very distracting – students view their unfamiliarity as possibly being an indication of being incorrect. 'Consulted' attracted students for this reason (in Year 5, 3 out of 9 students chose 'consulted' instead of the target word 'decision'). *I'm attracted to a word if I don't know it, because I don't know if it's right or wrong (Y5)*. However, a fairly poor speller in Year 9 pointed out that he equally did not know if the word was right just as much as he did not know if it was wrong, so why should he pick it.

Students say they work hard for the marks in MNI – they have to eliminate correct words, find the wrong word, work out what is wrong with it and correct it.

I was taking longer when I had to look at the word [in comparison to dictation]. I had to think harder. (Y7)

Most students referred to identifying mistakes by the fact that the word 'looks strange' or 'looks wrong' rather than by knowledge of an alternative correct spelling. Even those who cannot spell the word they identify, still often pick the correct target word.

Very skilled spellers like proofreading because they can identify the incorrect words fairly easily. At the same time, they use the identification process to see the way to correct the mistake. Students have to be confident spellers to hold this view.

In response to the question 'Does the incorrect spelling of the word distract you?' a Year 5 student responded: *No, it helps me spot what is wrong.*

The wrong spelling gives you an advantage because you know one way not to spell it! (Y7)

Some students who preferred proofreading to dictation gave quite sophisticated answers as to why.

I prefer proofreading to dictation because none of the words are completely wrong, you can see the base word. You just have to change a couple of letters. Dictation is much harder. Sometimes I apply rules for spelling, like in cried changing the y to an i. Mostly though it's on how they look. (Y5)

I like proofreading because when you see it on the screen you can see it looks different to how you are used to seeing it. In dictation, if you spell it wrong, you can't see it, you're thinking about how it sounds rather than how it looks. But it might be that in younger years they are more used to hearing. (Y9)

In terms of effort [MI] is easier but personally I think I like [MNI] because I like finding the word because when you find it you automatically know what's wrong with it and can fix it. (Y7)

MNI items

In MNI proofreading items, students have to successfully identify the incorrect word before they have a chance of spelling it correctly and scoring on the item. The sentence in which the word appears is deliberately constructed to contain correctly spelled 'distractors' to increase the challenge of identifying the target word. At each year level there were instances of students choosing a (non-target) correctly spelled word and changing its spelling to make it incorrect as their response.

MI vs MNI items

Most students prefer the more straightforward task provided by the mistake identified items. This is in line with students' idea that spelling tests are best dealt with quickly and efficiently.

I prefer [MI] to [MNI] because you still have to think but you can concentrate on the error. It's like when someone looks at your work they can see the errors and point them out to you, but if you wrote it, it's much harder. (Y7)

I prefer [MI], it's clearer what I have to do. [MNI] you really have to look for it. It's not as clear. (Y7)

I prefer the sentences where the word is underlined. It's clearer and makes more sense. The wrong spelling confuses me. (Y7 NESB student)

I think if the [MNI] items were read out to you, you might spot the problem easier, you hear how the words are said correctly. (Y9)

I like both of them (MI, MNI) but the one with the word underlined is much easier because you just have to focus on the word. Rather than having to decide, because if you are not immediately sure it can be difficult because you have to go through every word and check. (Y9)

Computer-Based Test Experience

There were few technical issues in logging on and running the test. It was a simple, predictable and stable process. There seemed no problem with using whichever browser was running. The only issues encountered related to running the test on iPads in one primary school (see below).

Not all students were familiar with how to adjust the volume on the computer they were using. One desktop computer could not be adjusted to have sufficient volume unless headphones were used.

Students specifically mentioned liking the on-screen timing clock giving time remaining (rather than relying on a distant classroom clock) and the item counter.

This is a better way of taking the test. Younger kids are more used to computers, that's what's good about an online test. But I would like to see my score straight away and to be able to hear the instructions read out. (Y7)

iPads

There were several problems with the use of iPads. The iPad revealed predictive spelling suggestions. Neither students nor interviewers knew how to disable this function.

Throughout the test the screen would periodically freeze and items would need to be reloaded, either by going **Back** then **Next** or by clicking on the address bar. This happened to all interviewers (3 interviews) 6 to 8 times in an interview.

More investigation would be needed to make the iPad a stable, reliable test delivery medium.

Reviewing Answers

Students were observed and questioned about their intentions to review their answers, especially at the end of the dictated section of the test. They needed to decide then if they wanted to revisit any answers as they would not be able to return once they proceeded to the proofreading section (see Figure 4).

Figure 4: Confirmation screen instructions at the end of dictation

You have finished one part of the test. When you click 'Next', your answers for this section will be scored and you will move to the next part.

If you want to check an answer in this part of the test, click **Back**.

If you are ready to start the next part, click **Next**.

There were many different understandings of what the screen shown in Figure 4 meant. A number of students expected to receive an immediate score for the dictated section (as a result of the reference to their work being scored) and they did not always recognise they could not return to the section after clicking **Next**. In fact, many would have taken only cursory notice of the screen had they not been asked about it.

Students were reluctant to review what they had done, unless they had left a word out with the intention of returning to it. However there was no signal (such as a question number being highlighted) that they had omitted an item. The perceived difficulty of going back screen by screen was a deterrent. Students wanted an easier way of checking answers, as they can on a paper-and-pencil test where their answers or omissions can be seen at a glance.

You need an easier way to find the question you want to go back to, on this test it is slow going backwards by each question. (Y5)

One student responded at the end of the dictation: *You can't go back after this. Is it going to be an overall view of what you've done or do you have to go through every question? That's kind of inconvenient, an overall view would be best. (Y3)*

In reference to paper-and-pencil test layout one said: *If there's a word I don't know, then it's easy on the paper test to go ahead and do the words I know, then come back later. That's hard to do on the computer. (Y5)*

On paper I would finish the whole test and go back if I had time. I'm not prepared to stop in the middle of the test [i.e. after dictation] and go back. (Y9)

If I was doing a paper NAPLAN I'd check my answers. I won't check these, I'm fairly confident I have done as well as I can. I'm not going back because it's too hard. (Y9)

With the computer, if you don't know something [and skip it], it's hard to go back. (Y9)

Students made some thoughtful suggestions about how to improve the operation of the test to make checking easier.

Students' recommendations

- At the end of the dictation section, display a list of the student's responses for all the dictated words, accompanied by item numbers, as a way of reviewing them. If it is not possible to correct answers at this point, at least students would know which items they wished to return to. All subsequent interviewees offered this suggestion were enthusiastic about it. *That would make it easier, less time consuming than going back one at a time. (Y9)*
- Have a list of question numbers on screen so students can highlight the number of any item they wish to return to or see by highlighting where a question has been left unanswered. At the end, students could click on those particular item numbers to review or complete items. Students reported this as common in online tests or quizzes.

Typing and handwriting

Younger students were more likely to identify themselves as poor and slow typists. However, many also said that handwriting hurt their hands and that typing did not.

Older students preferred typing, for speed and legibility.

No students reported feeling penalised by having to type their responses.

Typing was acknowledged for being easier to change and correct:

If you make a mistake you don't have to rub it out, you just backspace. (Y5)

I prefer to type, you can change the word easily and it always looks good. (Y5)

There were different opinions about whether students felt they were more likely to spell accurately in handwriting or in typing.

I'm used to seeing words in handwriting more; I can see mistakes more easily. On computer you are used to spell check, so you expect typed words to be correct. (Y9)

A Year 9 student who prefers typing said: *The word is in my head, I'm not relying on how it feels to write it.*

Many students commented that they were more confident about submitting typed answers because there was always enough room in the box for the typed word and there wasn't the possibility of a human marker being unable to decipher their handwriting.

I feel my handwriting could affect my mark if people couldn't read one of the letters. (Y9)

Utilising scrap paper

Interviewers supplied students with scrap paper and a pencil, and invited them to use it if they wanted to check their answers or note down item numbers. The interviewer retained the paper after the interview. A number of students made use of the paper and saw it as an important part of their spelling process. Several commented that everyone should have access to scrap paper, even if the test is online.

Paper's good, you can write it, you can see how it's spelled, check it then type. It's good to have paper nearby. Sometimes if you read a book you have that image of the typed writing, but you can write it down to double check. (Y5)

I'd rather type only because it's faster. [But] I'd rather write to make sure it's correct. It's more obvious if it's correct when I write it. (Y7)

I prefer typing, but I felt more comfortable with a pencil in my hand to jot down possible options before committing them to type. (Y7)

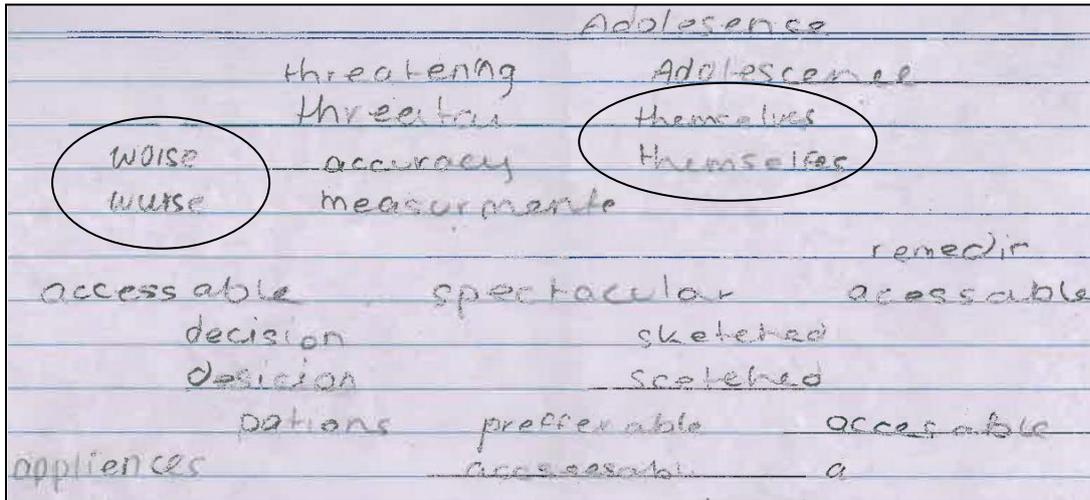
I like to use handwriting to check difficult spelling. When I type a long piece of work I just rely on spell check to make the spelling correct. (Y9)

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One student suggested an online scrap paper feature: *As I can't rub out and try to spell the word again or write in the back of the book like I'm used to, it would be good to have an online scrap paper.* (Y9)

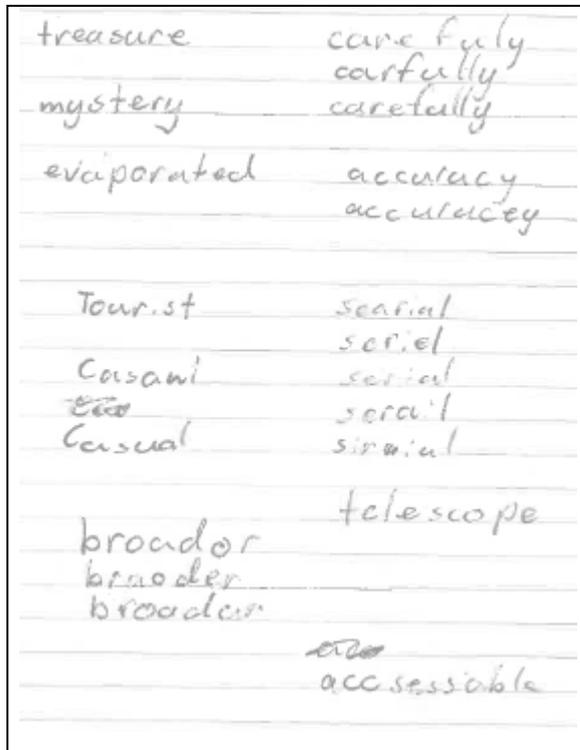
Which students made use of the scrap paper was unpredictable. It was not only good spellers, although extremely bad spellers were unlikely to pause and check. One year 7 NESB student who was becoming a very proficient speller made heavy use as she checked the validity of her answers. However, she also changed correct answers to incorrect after going through this process. (Figure 5)

Figure 5: Scrap paper 1



The year 7 student whose scrap paper is reproduced below used it to repeat the same word with multiple different spellings, seeking to find the word that 'looks right'. This was an approach adopted by a number of students who used scrap paper.

Figure 6: Scrap paper 2



Circling and underlining

In the current NAPLAN test, MI target words are circled, whereas online the target words were underlined. Students were asked which method they preferred.

The blak horse is under the tree.

The blak horse is under the tree.

There was no strong preference in either direction. Most students thought that the word was identified either way. Some students felt that the circle made the word stand out more clearly, others thought the underlining allowed the word to appear more naturally in its context. Several students thought the underlining could be more pronounced.

Underlining makes the sentence easier to read. (Y3)

(I prefer underlining) because it doesn't separate out the error from the rest of the sentence. (Y7)

I like underlining because I can read the whole sentence with the word in it. (Y7)

Underlining is better because it doesn't isolate the word from the sentence. (Y9)

Layout of proofreading items

Many respondents believed the layout of proofreading items could be improved.

A lot of the suggestions for change and improvement related to the size of the text on the screen. Many students were observed leaning in toward the screen so that they could read the very small text. The position of the entry box and the relationship between the instruction and the item were also commented on by students.

Students' recommendations

- Make the font bigger.
- Make the response entry box appear in a consistent position on the screen; make it bigger and the font in it bigger so it is easier to see the response. However, this should not make it easier for the student behind to see what is written.
- Separate the instruction from the target sentence either by space or a different typeface such as bold or italic.
- Consider not repeating the instruction after the first time for each item sort, or giving only a cut down version e.g., **Spell the underlined word**. (There was not a strong feeling about this though. Equal numbers of students were quite happy to have the instruction repeated.)
- Move the item further up the screen, so it is closer to the **Next** button. (Smaller laptops and tablets required students to scroll up and down the screen more because of the space left empty above the item.)
- On opening a new item make the cursor appear inside the answer box, so that it is possible to start typing immediately after hearing the item, without having to move the cursor onscreen. Some students commenced typing their answers before repositioning the cursor to the text box.
- Incorporate an on-screen 'scrap paper' space.

Overall, the general feeling was that the test appearance should be simple and not intrusive, just plain and clear and doing the job. Similarly, the voices for dictation – plain, clear, consistent. The theme was that students should just be left to concentrate on doing the job without being confused or distracted by extraneous effects.

Perception of difficulty

Students were asked if the online test they took was easier or harder than paper-and-pencil NAPLAN.

Table 1: Comparative difficulty

Year	Easier	Same difficulty	Harder	Easier and harder	Total
3	2	5	1	1	9
5	4	4	1	0	9
7	5	0	1	4	10
9	3	4	2	1	10
Total	14	13	5	6	38

Overall, the difficulty of this test was perceived as either the same as, or easier than, paper-and-pencil NAPLAN. Most students thought that the additional dictated items were easier than the types of items currently used in the NAPLAN Conventions of Language papers...

Some students judged it as easier than the paper-and-pencil test but with a small number of much harder words (hence the easier **and** harder category). Some perceived (accurately) that this test went to the extremes more.

The start was really easy but the end was really hard. (Y3)

It was quite easy then at the end the difficulty went up quite dramatically. (Y7)

Most students noticed that the item difficulty did not increase steadily.

Referring to dictation: *I found it surprising it didn't just keep getting harder, it gets hard then easy, hard then easy but it ended up hard. (Y9)*

The difficulty went up and down but was definitely harder by the end. (Y3)

Some of the hard words popped in quite randomly. (Y7)

Students' reactions to unpredictable changes in difficulty were mixed. Variation in difficulty can be uncomfortable: *I like it when a test gets harder gradually, not suddenly. (Y3)*

You have to concentrate the whole time because you could get an easy or a hard question, instead of NAPLAN that just goes from easy to hard. (Y9)

It keeps you engaged. (Y3)

It makes it more interesting and keeps my mind on the test. (Y5)

The mixed difficulty was not a problem; in fact I got to focus more on harder words here because they weren't all at the end. I usually zone out a bit of paper tests as it starts to get harder. (Y9, poor speller)

Cognitive processes associated with spelling

The English language exhibits a deep or ‘opaque’ orthography in which the relationship between morphemes (letters or groups of letters) and phonemes (their pronunciation) is frequently indirect, irregular or arbitrary. As a consequence, for successful spelling in English it is necessary to memorise the spelling for literally tens of thousands of individual words (or ‘word-patterns’). Current research² indicates that there are specific centres in the brain responsible for recognising printed words, and discriminating between words and non-words.

It is unsurprising therefore that the most common method students said they used to decide if a word was spelled correctly was that it ‘looked right’ or ‘looked wrong’. The process of spelling a word, whether in dictation or proofreading, generally seemed to involve a process of attempting to reproduce this mental pattern of what a word ‘looks like’, with results ranging from immediate and accurate automatic recall of very common high-frequency words, to students remembering particular morphological features of a word and attempting to insert them into a word-pattern for which they had a partial, but faint or incomplete, mental pattern.

One incident illustrates the latter. A year 9 student remembered that the word *techniques* contained an unexpected *qu* and initially used it to represent the first hard *c* sound, writing *tequenes*. He looked at this spelling and was puzzled, before changing the word to *techneques* and saying with satisfaction *There we go*. When asked about why he changed his answer he said *I knew it had a qu but I couldn’t figure out where it went. Then I remembered I knew tech*.

Only when a student lacked a complete mental picture of a word pattern did they generally resort to ‘phonological fitting’, or trying to match the sounds of a word to their stored repository of morphemes capable of representing that particular phonological pattern.

Of particular interest in this respect is another year 9 student who appeared to have almost no stored word-patterns, and seemed to rely entirely on phonological matching for his spellings. For this student, spelling did not appear to be a process of reproducing certain remembered arbitrary or irregular morphological features matched to an existing mental pattern. His spellings indicate that he heard the words clearly. He then rendered them rapidly and confidently with recognisable phonetic representations. Examples include *oroshun* (erosion), *pashins* (patience), *tekneeks* (techniques), *gradjuwashon* (graduation).

For other students, if they encountered an unfamiliar word (for which they had no mental picture to call on), one strategy they employed was to substitute a familiar spelling with the same sound, e.g., *consalted*.

At other times, lack of familiarity meant the student would not even try to spell a word. Familiarity with a word is important in being prepared to attempt it.

² McCandliss, B., Cohen, L. & Dehaene, S. (2003). The visual word form area: expertise for reading in the fusiform gyrus. *TRENDS in Cognitive Sciences*, 7:7 (pp. 293-299).

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Writing a word from dictation does not appear to be harder than correcting a mistake identified word. In fact, many students believe it is easier, because you don't get put off by seeing the word spelled incorrectly. You hear the correct pronunciation, recognise the word and go directly to your own knowledge of the word. However, as noted earlier, more confident spellers can also regard the incorrect spelling as a source of information.

Students have very varied word attack skills (such as recognising when to implement an *e* drop before adding a suffix, making a *y* to *i* change before a suffix, knowing that a past tense verb usually ends in *-ed* not *-t*).

Some students seemed to have sparse knowledge of rules to inform their spelling or to give them strategies when spelling unfamiliar words.

Good spellers, on the other hand, have a range of strategies – appearance, word building, recurring patterns, phonetic knowledge, rules – to draw on. When they could not determine a satisfactory spelling by look alone they might sound the word out, rely on a related word (*carnivorous* when spelling *herbivorous*), or look for a root word (one commented while spelling *accidental* correctly, *I just wrote accident and added al*). They also rely on several senses – sight and pattern recognition, the 'feel' of the word when they write it, and sound (many commented *I say it in my head*).

I heard it, I would say it to myself and I would write it according to how I say it to myself. I sort of see it in my head, I sort of see that image. (Y5)

Good spellers are often aware that they have made a mistake – they know it's wrong, even if they don't know how to fix it.

Good spellers cannot always articulate which strategy or strategies they have used to spell a particular word, they simply do it.

Some words or patterns were notable for being consistently challenging. The *-tch* trigraph appeared hard (scratched and sketched). Endings were difficult, such as *-le/-al/el* (article, towel) - *ible/-able*. Deciding whether an *s* sound was represented by *s* or *c* or *sc* or *x* was also difficult. This was demonstrated in words such as *certificate*, *decision*, *miscellaneous*, *adolescents*, *sanctuary*, *exercise* and *accidental*.

Summary and recommendations

Students do not have high expectations of being engaged by a spelling test. However, the online delivery of this test did pique their interest. Difficulty was only engaging for exceptional spellers who regarded MNI items as intellectual puzzles to solve. More commonly observed was the disengagement students manifested when they encountered words they did or not know or words they felt they had no chance of spelling correctly. A branching test would better accommodate both types of speller.

Observations of students taking the online Spelling test indicate that they adapted rapidly to the dictated format, and found it easy and convenient to operate. The higher quality that will result from greater sophistication in the recording of sound files should only increase their satisfaction. Students regard dictation as a fair and valid way to deliver spelling words.

Students appreciated features of the interface such as the countdown clock and the presentation of items one at a time, as well as endorsing the dictated section of the test. They believed even greater use could be made of online technology to further enhance their test experience.

Students were familiar with the format of the proofreading items in the test and had little difficulty completing them in their online form.

Typing rather than writing their responses was not problematic for any of the students.

Students had considerable awareness of the cognitive processes they engage in when spelling. Some students did report that they liked to check the accuracy of their spelling of a word by handwriting it on scrap paper. Others felt there was no difference in their perception of correctness between a handwritten and a typed version. Older students were more comfortable to rely on assessing just their typed representation of a word.

The following recommendations draw heavily on students' own suggestions about how to improve the online delivery of the test.

Ways to improve the checking and review of dictation responses

- At the end of the dictation section, a list of all the responses for the dictated words could be displayed, accompanied by item numbers, as a way of reviewing them. If it is not possible to correct answers at this point, at least students would know which items they wish to return to.
- The screen could include a list of question numbers so that students can highlight the number of any item they wish to return to, or see by highlighting where a question has been left unanswered. At the end, students could click on those particular item numbers to review or complete items. Students reported this as common in online tests or quizzes.

Making greater use of sound technology

- A sound file of each of the proofreading sentences could be made available. Students would then have the option of hearing the sentences in the proofreading section read aloud.

Presentation of proofreading items

- The size of the font used in proofreading items should be increased.
- The response entry box should be made larger and appear in a consistent position on the screen. The font in the box should also be larger so that students can easily see what they write.
- The instruction should be separated from the target sentence either by space or a different typeface such as bold or italic.
- Consider not repeating the instruction after the first time for each item sort, or giving only a cut down version, e.g., **Spell the underlined word.**
- Items could be moved further up the screen, so they are closer to the **Next** button. Smaller laptops and tablets required students to scroll up and down the screen more.
- The cursor should default inside the answer box, so that it is possible to start typing immediately after hearing the item, without having to move the cursor on the screen.
- Students could be provided with ‘scrap paper’ or an on-screen ‘scrap paper’ space could be provided.

Limitations of the study

This study is an initial step in exploring students’ engagement with online spelling assessments that should inform further research into the impact of student engagement on performance. All observations and conclusions presented in this report are necessarily limited by the small and non-random student sample. Only 38 students were observed from five independent schools, the schools had volunteered their involvement, and students were selected from a smaller pool who had returned parental permission slips.

Appendix 1: Spelling protocol

Cognitive Interview Protocol Outline:

This structure organises the cognitive interviews in a series of phases. This table gives an overview of the phases.

Phase 1: Set-up	Set-up phase		Outline the process to the student. Log them into the system. Tell students that the test will be in two sections, one of which will require them to listen to spelling words, and the other which will require them to read them. Further note that 50% of the spelling words that they listen to will be through speakers, and 50% through headphones. Prepare recording.
	Brief students on ongoing comments		Explain to the student that we would like them to make regular comments on the items as they progress through the test, noting in particular if they cannot understand or do not recognise a dictated word, or do not understand the sentence in which it is used. Also mention that we are interested in any difficulties that they may have related to using the computer itself.
Phase 2.1: Dictation	Prompt commenting with first group of items		For the first two items, prompt the student to give feedback on the issues of: <ul style="list-style-type: none"> • difficulty • familiarity • clarity of recording.
	During the test Dictated spelling	Observe	As students take the test, observe relevant and interesting behaviour. In particular note technical issues such as problems in typing, the number of times students play the audio for a particular spelling word, and if students check the answers that they have entered before proceeding to the next item.
		Monitor comments	Note down any comments students make about items as they proceed through the test.
		Concurrent interview	When students reach items flagged as CI stop them once they have finished the item. Take the student through the concurrent interview protocol for the item.
Phase 2.2: Proofreading	Brief students on the proofreading phase, and how we would like them to give us feedback		Explain to the student that we would like them to make regular comments on the items as they progress through the test, noting in particular if they cannot understand the given sentence in an individual item, and what their difficulty in understanding it might be. Also mention that we are interested in any difficulties that they may have related to using the computer itself.
	During the test Proofreading	Observe	As students take the test observe relevant and interesting behaviour. In particular note technical issues such as problems in typing and if students check the answers that they have entered before proceeding to the next item.
		Monitor comments	Note down any comments students make about items as they proceed through the test.
		Concurrent interview	At the second item, confirm student understanding of the on-screen instructions. When students reach MNI items flagged as CI stop them as the item appears onscreen and ask: “Which word do you think is incorrect?” “How did you decide which word to correct?” For all MI Items, make note of any misspelled words. Keep a list of these and return to them at the beginning of the retrospective interview.
	Finishing the test		Ensure students have finalised the test properly and finish up. Allow them to take a short break.

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Phase 3:	Retrospective interview	Whole test	<p>Debrief student about the experience with the test and how it compared with typical paper-and-pencil NAPLAN test. Was the test more or less engaging? Which section was more difficult, dictated spelling or proofreading and why?</p> <p>Ask students to comment specifically on the dictation – if it could be heard, if it was clear, etc.</p>
	Thank the student for their time and contribution		

Test sequence outline:

Log in	Demographic items	Practice questions	Holding screen (code 6251)	Dictated spelling questions	Confirmation screen	Proofreading questions	Log off
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Phase 1: Set-up

Initial set-up

Liaise with the Pearson Trial Invigilator and a representative of the school regarding the students you will be interviewing and the times. Ensure you have a quiet area to conduct Session 1, Session 2 and Session 3 (as required) that has a reliable computer with internet access.

Clarify any housekeeping and timing issues regarding break times, toilet visits etc.

Ask a knowledgeable teacher if there are any special steps when logging in for students. Confirm also what the preferred web-browser is – there is likely to be one that is more regularly updated.

Ensure you have with you:

1. The Cognitive Interview Protocol (this document)
2. Student log in guide
3. Master list of log-ins used
4. The year-level specific interview sheet
5. Video camera, tripod and cables

Once you are in the room, set up the camera and arrange the room so that it is suitable for the interview.

Student set-up

Once the student has arrived at the room where the interviews will take place introduce yourself to the student.

Hello, I am _____.

I am visiting your school to see how well Spelling tests work. I need your help to find out how we can improve these. I am not here to see how well you do in the test I will ask you to take, but we do need you to try your best.

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Show the student the video camera and say:

I am going to use this video camera to record what appears on the screen. I will place it so that it will not video your face.

Put the camera in a position where it has a good view of the screen but not the student. Switch on the camera so the student can see what it will be recording.

The camera also has a microphone that will be recording our conversation. The purpose of this is to capture in detail what we say; it would be difficult for me to write down everything and listen carefully to what you say at the same time...

We will only use the recording to help us research the test you are doing. The recording will not be used in public. Your name won't be on the recording.

I will tell you when the camera has started recording.

Explain about the sessions.

There are two sections in this test. In the first section, you will listen to spelling words being read out through the computer, and in the second section you will read the spelling items yourself onscreen. For most of the words that you have to listen to, we'll listen through the computer speakers, and for a few, you'll listen through headphones. Taking the test will last approximately 40 to 50 minutes.

After you've finished, I will ask you some questions about the test you've just taken. There are no right or wrong answers to these questions because we want to hear your own opinion. This will take about 10 to 20 minutes.

Ensure the student has a pen or pencil and some writing paper. Ask them to write their name on the paper.

Phase 2: Taking the test

Log in process

On your observation session sheet note the student's name, gender, log-in code and password. Record the student name and password on the Master list of logins.

Give the student their log-in and password. Ensure the computer is showing the Assessment Master log-in screen.



Get the student to log themselves in.

Demographic details screen

The students will be first presented with a screen asking for their demographic details and patterns of computer use. Ask them to fill this in and give assistance if they need it.

The observation/interview sheet will start with a copy of this screen. Record all the student's answers on the observation sheet.

Dictated spelling

Introduce the test

Explain how you will proceed.

In a moment I would like you to start the test. The camera will record what happens on the screen. I will be making notes about how the test is working for you.

Explain that you would like them to comment throughout the test:

As you attempt each question please feel free to talk about the question you are working on. We would like to know if you cannot understand or do not recognise a word that you hear, or if you do not understand the sentence in which the word is used. We would also like to know when you notice a change in difficulty – if you think the test jumps from easy to hard or hard to easy.

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Just as much, we're interested in when you get bored, or when you find something in the test you really like, so be sure to tell us when that happens.

Finally, if there's anything that you have trouble with in the process of taking the test on the computer, that's important to us too. If you think the test should be changed in any way or could be improved so that it works better for you, let us know.

Then explain that you will also be stopping them from time to time to ask them questions:

From time to time I will also ask you to stop for a moment. I may then ask you some questions about what you are doing or thinking. This will never be because I think you are doing something wrong. I will only ask questions because I want to learn something from you.

Unfortunately I cannot help you with any of the questions or explain what you have to do. If you are stuck please say so, and it is okay to move on to the next word.

Ask the student if they have any questions about the process and answer them. Then say:

I am now starting the camera recording.

Start the camera recording and tell the student they may begin the test.

Start the dictated spelling section of the test

The test begins with two practice questions. For these questions, give the student basic instructions on how to negotiate the dictated spelling section:

Click on the button to hear the word. You can click on the button and listen to the word as many times as you like. Type your answer into the box when you are ready. When you have finished a question you can move to the next one by clicking on 'Next question' on the top right hand of the screen. You can go back to your previous question by clicking on the 'Back' button on the top left hand of the screen if you need to.

Enter the holding screen passcode (6251) to begin the test.

For the first two items, prompt the student to tell you about:

- The difficulty of the word.
- The familiarity of the word.
- The clarity of the recording.

These factors should be assessed by pausing after each of the first two items and asking the student:

- "Could you hear the word clearly?"
- "Can you say the word to me?"
- "Can you tell me what the word means?"
- "Do you think you know how to spell this word correctly?"
- "Was this a hard word or an easy word for you?"

Please refer to the observation sheet for guidance on specific items.

Headphones

Sometime after these first two items, give the student the experience of listening to two or three words through headphones, with the interviewer also using headphones. Even if they prefer that mode of listening, explain that you need to talk to them. Listen to the rest of the words through the computer.

Concurrent observation occurs for **all** items.

Write down on the observation sheet the student spelling given for each item. In addition, write down any observations/comments that relate to the following issues.

Concurrent observation – All items, Dictated spelling	
Item/context difficulty	Student comments on the difficulty of target words, or on the difficulty of the context sentence.
Engagement	Student comments or shows behaviour indicating interest in or particular engagement with an item.
Disengagement	Student comments or shows behaviour indicating a lack of engagement with an item or the test as a whole.
Sudden changes in difficulty	Items before and after sudden changes in difficulty have been highlighted on the observation sheet. Note down behaviours/comments for these items in particular.
Technical issues	This study is not a review of the test delivery platform but issues students may have with the platform should be noted as these may impact engagement or performance. Note especially problems in typing, lack of knowledge of where letters are on the keyboard, the number of times that a student plays the audio for a particular word (probe on reasons for this when it occurs multiple times), and if students check the answers that they have entered before proceeding to the next item.

Concurrent interview will occur reactively if a student spelling indicates a mishearing (e.g. leaves off an *-ed* or *-s* ending) or a student makes an interesting error (i.e. just not a simple misspelling of a target word). Pause the test and ask the student to say the word that they were spelling and explore the reasons for the error.

Take particular note of how students handle words highlighted on the observations sheet.

At the end of dictated spelling section (following Question 24) stop the student and invite general comments on their experience of the dictated phase. Tell them that they will now be moving to the second section of the test.

Proofreading

Introduce the proofreading section of test

Explain to the student that you would also like them to comment throughout the second section of the test:

Just like in the first section, we'd like you to let us know things you notice as you're going through this section of the test. We would like to know if you cannot understand the sentence that you read, and if you don't understand it, exactly what it is about it that you don't understand.

Just like before, we would also like to know when you notice a change in difficulty – if you think the test jumps from easy to hard or hard to easy. Also, tell us if you find something boring, or if there's something in the test that you really like.

Finally, if there's anything that you have trouble with in the process of taking the test on the computer, that's important to us to know too. If you think this part of the test should be changed in any way or could be improved so that it works better for you, let us know.

Read the instructions for each question carefully. If you have trouble with those, you can ask me. However, I cannot read the test questions to you.

Concurrent observation occurs for **all** items.

Write down on the observation sheet the student spelling given for each item. In addition, write down any observations/comments that relate to the following issues.

Some items have also been flagged as being of particular interest.

Concurrent observation – All items, Proofreading	
Item/context difficulty	Student hesitation/comments on the difficulty of items or the difficulty of the context sentence (when observed, probe on whether it is the target word or the context sentence that is causing difficulty; note especially cases in which an easy target word is made difficult by a difficult context sentence).
Engagement	Student comments or shows behaviour indicating interest in or particular engagement with an item.
Disengagement	Student comments or shows behaviour indicating a lack of engagement with an item or the test as a whole.
Sudden changes in difficulty	Items before and after sudden changes in difficulty have been highlighted on the observation sheet. Note down behaviours/comments for these items in particular.
Technical issues	This study is not a review of the test delivery platform but issues students may have with the platform should be noted as these may impact engagement or performance. Note especially problems in typing, lack of knowledge of where letters are on the keyboard, and if students check the answers that they have entered before proceeding to the next item.

Concurrent interviews

At the start of the first MI and MNI item in the proofreading set, stop the student and check their understanding of the proofreading instructions by asking them to explain what the instructions mean (indicated on observer sheet).

For all MI Items, make note of any misspelled words. Keep a list of these and return to them at the beginning of the retrospective interview, as per the protocol provided.

For selected MNI items indicated on the observation sheet, stop the student as the item appears on the screen. Ask them to read the sentence aloud and tell you any words that are unfamiliar. Discuss how they go about selecting the incorrect word:

- “Which word do you think is incorrect?”
- “How did you decide which word to correct?”

Phase 3: Retrospective interview

For any MI items misspelled during the testing phase, repeat the target word to the student at this time and ask them to write down the spelling word on their scrap paper.³

General impressions

In this section you will be asking the student about their experience with the whole test.

[Show the student a copy of the traditional paper-and-pencil NAPLAN Spelling test, and open the test just completed to Q24 so that they can make a direct comparison between the computer-based and paper-and-pencil NAPLAN formats.]

One difference between the test you took today and other tests you usually take (like NAPLAN) is that you took it on the computer rather than on paper. Did the test you took today differ from the NAPLAN tests you have taken in the past in any other ways?

Probe as needed: *Are there any other ways the tests differ? Can you explain what you mean? / Can you give an example?*

Ask the student about their overall engagement with the test.

How interesting or engaging did you find the test? Was it more engaging than NAPLAN, less engaging or about the same?

Probe as needed: *What was it about the test you found more/less engaging? What makes a test more/less engaging for you?*

Ask the student about their overall perception of the test difficulty.

How difficult did you find the test? Was it more difficult than NAPLAN, less difficult or about the same?

Probe as needed: *What was it about the test you found more/less difficult? What makes a test more or less difficult for you? What makes a spelling word hard for you?*

Ask the student about how the overall difficulty changed.

Overall did the test seem to get harder as you worked through it, or easier, or was it more mixed?

Probe as needed: *Can you explain a bit more? Give an example?*

Ask the student about the two different sections of the test:

Which section of the test was more difficult, the dictated spelling or the proofreading? Why? Which do you prefer? Why?

Was the dictated spelling clear, and easy to hear? Would you prefer to hear it through the computer, or having a person read it to you? Why?

³ This is to check if the student finds it easier to spell the word correctly when they do not see the word deliberately misspelled, as it is in the item.

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Did you prefer using the speakers or headphones? Why? Was one clearer than the other?

Is there anything that would make it easier for you to understand the person reading the words (for instance would it be easier if it were a man's voice rather than a woman's voice, or if you heard the word more times)?

Did you rely on how the word was pronounced to know how to spell it? If yes, Did you have to do this more with words that were difficult or unfamiliar for you?

How do you find typing the words versus handwriting them? Is typing them easier or more difficult for you? Why?

In the proofreading section, do you prefer when the error is underlined, or when you have to identify it yourself? Why do you feel that way? Which is easier for you, when the word is circled or when it is underlined? Show exhibit NAPLAN for comparison. Was it confusing that the two sorts of spelling items were mixed together (unlike the paper-and-pencil NAPLAN test)?

What did you think of the appearance/layout of these items on the screen?

Finishing up

Stop the video recording and turn off the camera. Show the student that the camera is now off.

Thank the student again for all their hard work. Check with them that they know where they need to go next and send them on their way.

Appendix 2: Sample

The following tables show characteristics of the schools and students sampled.

Table A2.1: Participating Schools in NSW

Area	Sector	Type	Location	Number of interviews
Eastern suburbs of Sydney	Independent	Single-sex (girls)	Metropolitan	11
South-western suburbs of Sydney	Independent	Coeducational	Metropolitan	6
Hunter Valley	Independent	Coeducational	Regional	12
Central West	Independent	Coeducational	Regional	6
North West	Independent	Single-sex (boys)	Regional	3

Table A2.2: School sample by geographic location

Geographic location	Percentage of students
Metropolitan	45%
Regional	55%
Total	100%

Table A2.3: Student sample by year and gender

School area	Year 3		Year 5		Year 7		Year 9	
	M	F	M	F	M	F	M	F
Eastern suburbs of Sydney		3		3		3		2
South-western suburbs of Sydney		3	2	1				
Hunter Valley	3		2	1	1	2	1	2
Central West					1	3	2	
North West							3	
Totals	3	6	4	5	2	8	6	4
Year totals	9		9		10		10	

Appendix 3: Computer use

At the start of the tests, students were asked three questions about their familiarity with computers. The following tables show a summary of their responses.

Table A3.1: Computer use at school

Q1. How often do you use computers or tablets at school?					
	most days	some days	only for some classes	not often	Total
Year 3	5	3	1	0	9
Year 5	5	2	0	2	9
Year 7	6	3	0	1	10
Year 9	9	0	1	0	10
Totals	25	8	2	3	38

Table A3.2: Computer use at home

Q2. How often do you use computers or tablets at home?					
	every day	sometimes	not often	never	Total
Year 3	1	7	0	1	9
Year 5	4	4	1	0	9
Year 7	5	5	0	0	10
Year 9	7	2	1	0	10
Totals	17	18	2	1	38

Table A3.3: Touch screen phone use

Q3. How often do you use a mobile phone with a touch screen?					
	every day	sometimes	not often	never	Total
Year 3	1	2	5	1	9
Year 5	3	2	3	1	9
Year 7	4	1	3	2	10
Year 9	6	0	2	2	10
Totals	14	5	13	6	38

Table A3.4: Comparison of first and second computer use questions

		Q1. How often do you use computers or tablets at school?				
		most days	some days	only for some classes	not often	Total
Q2. How often do you use computers or tablets at home?	every day	15	1	1	0	17
	sometimes	7	7	1	3	18
	not often	2	0	0	0	2
	never	1	0	0	0	1
	Totals	25	8	2	3	38