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Is the PROBE Reading Assessment an Effective Measure of Reading Comprehension?

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Abstract
Although the PROBE reading assessment is widely used to assess the reading comprehension of students in New Zealand schools, there is little information available about the reliability and validity of the test.

The study reported in this article investigated the adequacy of the PROBE test for a group of Year 4 students.

The findings of the study raise some concerns about the reliability and validity of the test.

The article also discusses other issues that impact on the adequacy of the PROBE test, including
(1) a lack of information on the determination of reading ages for particular text levels,
(2) problems with the classification of comprehension questions, and
(3) variability in the ways that the PROBE test can be administered at different times.

Introduction
Since it was first published in 1999, the PROBE (Prose Reading Observation, Behaviour and Evaluation of Comprehension) reading test has become one of the most widely used assessments of reading in New Zealand schools (Education Review Office, 2005). The test is designed to assess the reading accuracy and comprehension skills of students in classes from year 3 to year 10 but can also be used with younger readers and adults (Parkin, Parkin, & Pool, 2002). According to the test’s publishers, the test “is held in very high regard by many thousands of teachers” and is “the world’s best behavioural assessment for measuring comprehension skills” (Triune Initiatives, 2007).

The PROBE test consists of twenty sets of graded passages with reading ages ranging from 5 – 6 years to 14.5 – 15.5 years. Each set consists of two passages, one fiction and one non-fiction. The test is designed to be administered individually by a class teacher who estimates which level of text to begin with for a particular student. The student is asked to first read through the passage silently and then to read it aloud. The teacher scores the accuracy of the student’s oral reading and then asks a series of comprehension questions. Answers are scored according to the guidelines in the test manual. The developers of the PROBE test emphasise that a feature of the test is that it provides information about specific comprehension skills because it makes use of six types of comprehension questions: Literal, Reorganisation, Inference, Vocabulary, Evaluation, and Reaction (Parkin et al. 2002). Students are deemed to be at a particular reading level if they accurately decode at least 95% of the text and score a minimum of 70% on the comprehension questions.

Although the PROBE is used extensively in New Zealand schools, little information is available about its effectiveness as a measure of reading. The test manuals for the original version of the PROBE (Pool, Parkin, & Parkin, 1999) and for the revised version (Parkin et al., 2002) provide no information about the reliability or the validity of the test. (Reliability refers to the consistency or stability of the measure whereas validity refers to whether the test really measures what it claims to measure (See Mckenna & Stahl, 2003.) The lack of information about the effectiveness of the PROBE makes it somewhat surprising that the test has been so widely used in New Zealand classrooms. It would appear that the test has filled a gap in the market by providing teachers with a test that can be used on a number of occasions throughout the school year in order to provide what the test publishers describe as “in-depth data about a student’s ability to read and understand text” (Triune Initiatives, 2007).

The study reported in this article was designed to investigate the adequacy of the PROBE as a measure of reading comprehension for middle primary school students. The participants for the study were 33 Year 4 pupils from two Year 3/4 composite classes in a decile six school in Auckland. The students’ mean age was 8 years 4 months at the start of testing, about halfway through the school year. Three months earlier in the year, 29 of the students had been assessed with the Progressive Achievement Test (PAT) of reading comprehension, a standardised reading test commonly used in New Zealand schools (Reid & Elley, 1991).

Class teachers made use of previous running records of students’ oral reading accuracy to assign students to appropriate reading-age levels for assessment with the PROBE test. The class teachers then assessed their students on either the fiction or the non-fiction PROBE passage at the appropriate reading level.

In the week following the teacher administration of the PROBE test, the first
author of this paper began further assessment of the students’ reading. Over a
five-week period, each student was assessed with the passage of the PROBE test
(i.e., fiction or non-fiction) that had not been used when a teacher had assessed the
student.

In addition, the first author individually assessed the children’s reading with the
Neale Analysis of Reading Ability (NARA) (Neale, 1999). The Neale Analysis is a
well-established test of reading comprehension that has been standardised on a
sample of nearly 1400 Australian children. Information on the standardisation
procedures, and evidence on the reliability and validity of the Neale Analysis, is
provided in the test manual (Neale, 1999). The test consists of two parallel forms
of six graded passages, each accompanied by comprehension questions. Children
read the relevant passages out loud and are scored for reading accuracy and their
response to the questions. Testing is stopped when children fall below a required
reading accuracy level (That is, a maximum of 16 errors for the first five passages
and 20 errors for the sixth passage).

The data gathered in the current study was used to investigate three questions:

1. 1) What is the reliability of the PROBE reading test as a measure of
       comprehension?

2. 2) What is the correlation between students’ performance on the fiction
       passages and their performance on the non-fiction passages of the PROBE
       reading test?

3. 3) What is the relationship between students’ comprehension scores on the
       PROBE test and their scores on the Neale Analysis and the PAT (Reading)?

This relates to the "concurrent validity" of the PROBE. If the PROBE is a valid
measure of reading, it would be expected that there would be a reasonably close
connection between children’s performance on the PROBE and their performance
on the Neale Analysis and the PAT.

FINDINGS OF THE STUDY

RELIABILITY OF THE PROBE COMPREHENSION SCORES

One method of investigating the reliability of the PROBE test is to examine the
correlations between the performance of students on even numbered questions
and their performance on odd numbered questions for a particular reading passage.
Generally, there is no reason to expect that performance on even numbered items
would be markedly different than performance on odd numbered items. Hence a
high correlation between such items would be expected. A low correlation may
indicate that the test is not reliable.

Although 33 students were administered the PROBE test in the current study, their
range of reading levels meant that different students were given text passages
at different levels. This meant that the number of students reading a particular
passage ranged from one student (at the 7-8 year level) to thirteen students (at the
11-12 year level). Split half–reliabilities were calculated only for the passages that
were read by eight or more students. The results were as follows:

<table>
<thead>
<tr>
<th>Type</th>
<th>Reading Age Level</th>
<th>Count (n)</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiction</td>
<td>Reading Age Level 6-7 years (n = 8):</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>Non-Fiction</td>
<td>Reading Age Level 6-7 years (n = 8):</td>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>Fiction</td>
<td>Reading Age Level 11-12 years (n = 13):</td>
<td>.14</td>
<td></td>
</tr>
<tr>
<td>Non-Fiction</td>
<td>Reading Age Level 11-12 years (n = 13):</td>
<td>.50</td>
<td></td>
</tr>
</tbody>
</table>

The small sample size, and the fact that split-half correlations were only
calculated for four of the total of 40 PROBE passages, means that
cautions is needed in interpreting the results. Nevertheless, the low
correlations indicate that there may be problems with the reliability of
the PROBE test. (Reliability correlations for a test should be
a minimum of 0.80. See Rathvon, 2004.) In the absence of any
evidence about reliability from the test authors, the findings
of the current investigation do not provide confidence in
the reliability of the PROBE test.

A contributing factor to the apparently low reliability of
the PROBE could be the relatively short length of the test,
especially for the passages at younger reading levels. At the
6-7 years Reading Age, the text passages are only about 80 words long and

CHILDREN'S PERFORMANCE ON FICTION AND NON-FICTION PASSAGES

The PROBE Test provides two text passages for each Reading Age level, one fiction and
one non-fiction. The 33 children in the
current study scored at similar levels for
reading accuracy on both types of passage.
A high correlation ($r = .814$) was found
between children’s accuracy scores for the
fiction passages and their accuracy scores
for the non-fiction passages. This finding
suggests that the fiction and non-fiction
passages at a particular level were similar
in difficulty for oral reading accuracy.

A very different result was found for
children’s performance on the
comprehension questions. For the sample
of 33 children, there was only a small
 correlation ($r = .263$) between
comprehension scores on the fiction and
non-fiction passages. Although there was a
gap of up to five weeks between when
children were first assessed on one passage
and then assessed on the other type of
passage, it is unlikely that there would be a
significant change in comprehension skills
during this time. The finding of a low
correlation suggests that teachers should
not use performance on a fiction passage
to make judgements about children’s
comprehension of a non-fiction passage
and vice versa. The developers of the
PROBE test have correctly pointed out the
need to assess children on both fiction and
non-fiction material. Comprehension of
fiction and non-fiction involve different
strategies and research has found
considerable variation in individual

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Comparison of Student Performance on the PROBE Test and Performance on Other Measures of Reading.

An indication of the validity of a test can be gained by correlating student performance on the test with performance on a test that is widely recognised as having validity for measuring what it claims to measure. Both the Neale Analysis and the PAT (reading comprehension) have credibility as measures of reading. The manuals for these tests contain detailed information about reliability and validity, and the normative information that is provided is based on the results of administering the tests to large samples of children of different ages. It would be expected that well established tests of reading comprehension would show a high correlation between each other and this was the case with the results from the Neale Analysis and the PAT for children in the current study (n = 33). A high correlation (r = .810) was found between the children’s comprehension scores on the Neale Analysis and their comprehension scores on the PAT.

The Neale Analysis and the PAT each provide a total score based on a student’s overall performance on a range of passages. The PROBE test, however, provides scores for comprehension for individual text passages but does not provide a total score based on overall performance on a range of passages. This makes it difficult to compare students’ performance on the PROBE with their scores on the Neale and the PAT.

In the current study, different groups of students read different levels of text passages on the PROBE. For any particular group of students reading at the same PROBE level, it was possible to correlate scores on the PROBE test with scores on other tests of reading. However, the small numbers of students reading at any particular level makes correlation problematic. In Table 1, the correlations between PROBE and other measures of reading are reported only for the largest group of students who all read the same passage (the thirteen students who were assessed at the 11-12 year Reading Age Level).

Moderate correlations were found between performance on the PROBE passages and performance on the Neale Analysis. Correlations between the PROBE and the PAT, however, were at low levels. Overall, the correlational results suggest that a student’s performance on the PROBE test may not be a good indicator of where he or she would score on other tests of reading comprehension.

It would be unfair to make firm conclusions about the PROBE based on the small samples in this study, but in the absence of information about validity from the test developers, the results of the current study raise some concerns about the merits of the PROBE test. The findings of low split half-reliabilities, and low to moderate correlations with other measures of reading, do not allow the test to be recommended with confidence.

Other Issues Relating to the Value of the PROBE Test

Three further issues can be examined in relation to the value of the PROBE as an assessment of children’s reading comprehension. These issues relate to (1) the reading ages assigned to the text passages, (2) the classification of comprehension questions, and (3) variation in administration of the PROBE.

1. Reading Ages of Probe Text Passages

Each of the 40 text passages in the PROBE test have been assigned a Reading Age ranging from 5 - 6 years to 14.5 – 15.5 years. Teachers using the test might expect the Reading Ages to indicate the level of text that an average child of that age would be capable of reading. However, the developers of the PROBE do not provide any evidence that the passages have been trialled on groups of children of particular ages. Instead, they note that the grading of the passages “has been largely determined using the Elley Noun Frequency Method (Elley & Croft, 1989), with some cross checking using the Fry Readability Formula (modified) for higher level texts” (Parkin et al., 2002, p. 7). Holdaway’s sight words list (Holdaway, 1972) was used for guidance with lower level texts. The use of such methods can help inform judgements about text difficulty but no information is provided in the test manual about how individual passages scored according to these measures. Moreover, the test developers note that they have also used their “collective experience” to judge text difficulty. This adds a further layer of subjectivity to judgements about the text passages. The lack of information about any trialling of the passages on groups of children means that teachers cannot assume that the assigned Reading Ages are an accurate indication of the average performance of children at particular ages.

2. Classification of Comprehension Questions

The PROBE test is promoted by the test publishers as “being designed to provide in-depth data about a student’s ability to read and understand text” (Triune Initiatives, 2007). The publishers note “the unique feature” of the PROBE is that it “focuses on the assessment of six targeted and defined question types. These allow for a clearer analysis of the reader’s comprehension ability” (Triune Initiatives, 2007).

The six comprehension questions are defined in the test manual (Parkin et al., 2002) as follows:

<table>
<thead>
<tr>
<th>Question Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal</td>
<td>Information that is given directly in a text.</td>
</tr>
<tr>
<td>Reorganisation</td>
<td>Reconstructing two or more pieces of information contained in the text.</td>
</tr>
<tr>
<td>Inference</td>
<td>Information implied but not given directly in the text.</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Determining the meaning of the unknown words from context.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Extrapolating additional information not given in the text.</td>
</tr>
<tr>
<td>Reaction</td>
<td>Expressing an opinion based on information given in the text. (p.16)</td>
</tr>
</tbody>
</table>

The test manual, however, provides no indication of where this classification of questions comes from. No theoretical rationale is given, nor is any reference made to empirical evidence that suggests that comprehension questions can be divided into these particular categories. The manual does not refer to any publications on the assessment of comprehension.

The distinction between the six question types is not always clear. For example, there appears to be an overlap between “Inference” questions, which require the reader to work out information that is implied, and “Evaluation” questions, which require the reader to extrapolate additional information.

Some questions in the PROBE have not been assigned to the category that the definitions in the test manual would seem to suggest. For example, in the
text passage 'Train' (Reading Age 11-12 years), Question 5 asks: "Why were the surroundings unfamiliar?" This question is classified as "Inference", that is, where "information is implied and is not directly stated in the text" (Parkin et al., 2002, p. 16). However, the information for the answer is given directly in a sentence in the text which states: "It was his first time in this small country town and the surroundings were unfamiliar" (Parkin et al., 2002, p.73).

Another difficulty with the PROBE questions is that some of them can be answered without actually reading the text passage. Although prior knowledge contributes to reading comprehension, it should not mean that students are able to correctly answer test questions without having to read the text. On the PROBE test, however, there are a number of questions, especially in the lower reading age levels, that can be answered without reading the passage on which the questions are based. For example, the questions for the passage 'Swimming' (Reading Age 6-7 years, Parkin et al., 2002) include the following:

**What do we have to do to swim? (Move our arms and legs)**

**Why can’t we swim under the water for a long time? (We can’t breathe under the water)**

**What does the story tell you about swimming alone? (You shouldn’t swim alone).** (p.29)

All of these questions could be answered by students who have some knowledge about swimming, even if they had not read the text.

The problems that have been noted in relation to the PROBE comprehension questions mean that it is difficult to have confidence in the value of the six question types for providing "in-depth data about a student’s ability to read and understand text" (Triune Initiatives, 2007). Even if the classification of the questions into the six types was valid, it would be unwise to make judgements about a student’s comprehension sub-skills on the basis of his or her responses to a small number of items.

3. Variation in Administration of the PROBE Test

Teachers and schools use the results of the PROBE test to track the progress of individual students and to compare the achievement levels of different students. Using the PROBE results for these purposes assumes that teachers are consistent in administering the test in a standard way. It appears, however, that the PROBE test manual allows for some flexibility in how the test is administered. Such variation in administering the test could affect student performance and be problematic for comparing student results.

One difference in how the test is administered relates to whether teachers supply the correct word when a child is unable to identify a word. The guidelines in the PROBE manual first state that "unknown words should not be given" (Parkin et al., 2002, p.10) but then note that "assessors may use their discretion about supplying the unknown word [in situations where] a student has become ‘stuck’ on a word and overall fluency ... is being lost" (Parkin et al., 2002, p.10). Differences in how teachers apply their ‘discretion’ could lead to variability in how the test is administered.

Further variation in administering the PROBE arises when a teacher asks a student to read aloud or silently. The test manual states that if a student’s oral reading is to be assessed, the student is asked to "first read the story through to themselves, then they will be asked to read aloud to the assessor, and finally they will be asked some questions about the story" (Parkin et al., 2002, p.10). For fluent readers or if a student is uncomfortable reading aloud, the PROBE manual suggests that students be asked to read the text silently and then be given the comprehension questions. Although the manual suggests that it is preferable for students to read the passage twice, this may not always happen. If students do read the passage only once, they would be at a disadvantage when answering the comprehension questions.

Another source of variation in administering the PROBE is that “before beginning the set comprehension questions, students can be asked to retell the main points or events of the story” (Parkin et al., 2002, p.11). Whether or not a teacher decides to ask a student to do this could impact on how they answer the comprehension questions. Finally, it should be noted that although the test manual strongly advises teachers to ask all of the comprehension questions, teachers are permitted to ask a selection of the questions, thereby introducing another potential source of variation into how the test is administered.

Concluding Comments

Although the PROBE test is widely used in New Zealand schools, the reliability and validity of this assessment has not been established. The developers of the test have provided no evidence about the reliability and validity of the PROBE. The current investigation, albeit small in size, raises some concerns about the adequacy of the PROBE test as a measure of children’s reading comprehension. Among the concerns that have been noted are the low split-half reliabilities and low to moderate correlations between the PROBE test and other measures of reading comprehension. Concerns have also been noted about a lack of information on how reading ages are assigned to the designated test levels, problems with the classification of comprehension questions, and potential for variation in the administration of the PROBE test.

The PROBE test is only one of a number of reading tests that teachers are able to make use of when evaluating the reading levels of students. Other assessments that are commonly used include the Star Reading Tests (Elley, 2001), asTTle (Hattie et al., 2004), and running records of instructional reading texts (see also Croft, Stafford, & Mapa, 2001). The popularity of the PROBE test indicates that teachers have found it easy to use and have appreciated having access to a test that allows them to make repeated measures of their students’ reading comprehension in order to show progress over a period of time. There is now a need for a large-scale evaluation of the effectiveness of the PROBE test. If teachers are to continue to use the test, it is vital that they be provided with evidence that allows them to have confidence in the reliability and validity of this assessment.

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References


### Table 1

<table>
<thead>
<tr>
<th></th>
<th>Neale Analysis</th>
<th>PAT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROBE Fiction</td>
<td>.514</td>
<td>.291</td>
</tr>
<tr>
<td>PROBE Non-Fiction</td>
<td>.605*</td>
<td>.106</td>
</tr>
</tbody>
</table>

*p < .05.

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**Table 1**

*Correlations Between Student Comprehension Scores on the PROBE (11-12 year Reading Level), the Neale Analysis and the PAT: Reading Comprehension*