

## **Appendix B: Schedule for Early Number Assessment (SENA)**

### **Interview Guidelines (2000NZ)**

#### **Stage 0 of Early Number Learning: Task 1**

An incorrect answer to this question places the child at stage 0 of the SEAL framework, and indicates later questions (44 to 48) need not be asked.

#### **Numerical Identification: Tasks 2 to 22**

Each numeral is written on a separate numeral card. Each numeral card is displayed to the student, that is, flashing is not used in these tasks.

#### **Forward Number Word Sequence: Tasks 23 to 33**

Do not tell the student in advance the number word at which you will ask her or him to stop. Of interest is whether the student uses a *dropping-back* strategy. For example, the student says the number words forward from then “one” to figure out what comes after “nine”.

#### **Backward Number Word Sequence: Tasks 34 to 43**

On the first task, the interviewer indicates in advance to the student the last number word required, that is, “Count backwards from ten to one”, but this is not done on the second task. The interviewer observes closely to see if the student is using a *dropping-back* strategy. For example, the student says the number words forward from “one” to figure out what comes before “seven”.

#### **Stages 1 to 4 of Early Number Learning: Tasks 44 to 48**

Watch for the *highest* level that is clearly demonstrated. Children will often use a variety of strategies. They should be rated at the *best* stage they use.

Task 44 is presented as a word problem, that is, without counters, etc.

In Task 45, collections corresponding to each of the two addends are presented in turn. The collections are briefly displayed and then screened. Separate colours are used for each collection.

Of particular interest on tasks 46–48 is whether the student counts using a *counting-on* or *counting-down* strategy. A counting-on strategy may include explicit double counting, that is, “six is one, seven is two, eight is three!” Watch closely also for the most sophisticated strategies, that is, strategies which include procedures other than counting-by-ones, for example, non-count-by-one SEAL stage 4 strategies.

In task 47, it is of interest whether the student counts-on and keeps track of the number of counts. Explicit double counting may be used here as well, for example, “eight is one, nine is two, ten is three, eleven is four – four!” Less advanced students typically misinterpret missing addends tasks as addition tasks, for example,  $7 + \dots = 11$ , is misinterpreted as  $7 + 11$ . As above, watch for stage 4 strategies.

Task 48 is presented using a separate question sheet for each student. Cover the question sheet with an A4 card. Progressively reveal the questions to the student and record each answer, one at a time, on the question sheet. This item is designed to see whether a child uses the facile number stage (stage 4 in the SEAL).

### Base Ten Strategies: Tasks 49 and 50

Tasks 49 looks to see whether child counts by ones (Base 10 stage 1) or counts in tens saying 4, 14, 24, 34 (BTS stage 2 at least).

Task 50 uses a card on which “39 + 28” is written. This is designed to find whether child uses Facile Concept of Ten (BTS3).

### Schedule for Early Number Assessment (SENA)

Things the interviewer **says** to the student appear in **plain** type.

**Instructions and comments** for the interviewer appear in *italic* type.

### Stage 0 of Early Arithmetic Learning (SEAL)

Q (1) Get me eight counters from the piles.

*(The rest of the SEAL framework appears at tasks 44 – 48.)*

Stage & Behavioural Indicator
<b>0 Emergent counting</b>  Cannot count visible items. The child either does not know the number words or cannot co-ordinate number words with items.

### Numeral Identification

Q What is this number?

(2)	3	(3)	6	(4)	10	(5)	2	(6)	9
(7)	8	(8)	5	(9)	0	(10)	7	(11)	4
(12)	23	(13)	15	(14)	13	(15)	43	(16)	12
(17)	20	(18)	100	(19)	66	(20)	139	(21)	470
(22)	806								

Stage & Behavioural Indicator
<b>0 Emergent Numeral Identification</b> Cannot identify most of the numerals in the range 1–10.
<b>1 Numerals to 10</b> Can identify all the numerals in the range 1–10 only.
<b>2 Numerals to 20</b> Can identify all the numerals in the range 1–20 only.
<b>3 Numerals to 100</b> Can identify one and two digit numbers.
<b>4 Numerals to 1000</b> Can identify two and three digit numbers.

### Forward Number Word Sequence (FNWS)

Q Start counting from ... I'll tell you when to stop.

(23) 1.....32 (24) 62.....73 (25) 86.....103

- Q What's the next number after...? *If the student does not understand the meaning of the instructions say, "The next number after 2 is 3. Now what is the next number after ...?"*

(26) 5 (27) 9 (28) 13 (29) 19 (30) 27  
(31) 46 (32) 69 (33) 80

Stage & Behavioural Indicator	
<b>0 Emergent FNWS</b>	The student cannot produce the FNWS from 1 to 10.
<b>1 Initial FNWS up to 10</b>	The student can produce the FNWS from 1 to 10. The student cannot produce the number just after a given number in the range 1 to 10. Dropping back to 1 does not appear at this level.
<b>2 Intermediate FNWS up to 10</b>	The student can produce the number word just after a given number word but drops back to 1 when doing so.
<b>3 Facile with FNWS up to 10</b>	The student can produce the number just after a given number in the range 1 to 10 without dropping back. The student has difficulty producing the number just after a given number for numbers beyond 10.
<b>4 Facile with FNWS up to 30</b>	The student can produce the FNWS from 1 to 30. The student can produce the number just after a given number in the range 1 to 30 without dropping back.
<b>5 Facile with FNWS up to 100</b>	The student can produce the number just after a given number in the range 1 to 100 without dropping back.

### Backward Number Word Sequence (BNWS)

- Q Count backwards from ten to one.

(34) 10.....1

- Q Count backwards from 23. I'll tell you when to stop.

(35) 23.....16

- Q What number comes before ...? *If the student does not understand the meaning of the instructions say: "The number that comes before 4 is 3. Now what is the number before ...?"*

(36) 5 (37) 9 (38) 16 (39) 20 (40) 47  
(41) 13 (42) 70 (43) 31

<b>Stage &amp; Behavioural Indicator</b>	
<b>0 Emergent BNWS</b>	The student cannot produce the BNWS from 1 to 10.
<b>1 Initial BNWS up to 10</b>	The student can produce the BNWS from 1 to 10. The student cannot produce the number just before a given number in the range 1 to 10. Dropping back to 1 does not appear at this level.
<b>2 Intermediate BNWS up to 10</b>	The student can produce the number just before a given number but drops back to 1 when doing so.
<b>3 Facile with BNWS up to 10</b>	The student can produce the number just before a given number in the range 1 to 10 without dropping back. The student has difficulty producing the number just before a given number for numbers beyond 10.
<b>4 Facile with BNWS up to 30</b>	The student can produce the BNWS from 1 to 30. The student can produce the number just before a given number in the range 1 to 30 without dropping back.
<b>5 Facile with BNWS up to 100</b>	The student can produce the number word just before a given number in the range 1 to 100 without dropping back.

### Stages of Early Number Learning (SEAL)

This is the most important section.

Watch for the *highest* strategy that is *clearly* demonstrated. Children often will use a variety of strategies.

They should be rated at the *best* stage they use.

- (44) I have five apples and I get another three apples. How many apples do I have altogether?
- (45)  $9 + 4$ . Here are nine counters. (*Briefly display and then screen.*) Here are four counters. (*Briefly display and then screen.*) How many counters are there altogether? (*Use a separate colour for each collection.*)
- (46)  $12 \text{ remove } 3$ . I have 12 counters. (*Briefly display and then screen. Use counters of one colour.*) I am taking away three counters. (*Remove three counters without displaying any counters so that the counters are now arranged in two screened collections.*) How many counters are left. (*Indicate the screened collection of nine counters.*)
- (47)  $7 + \dots = 11$ . There are seven counters. (*Briefly display and then screen.*) I have some more under here and there are 11 altogether. How many under here? (*Use a separate colour for each collection.*)
- (48) What does this say? (*Uncover  $8 + 3$ .*) Can you work that out? (*If correct, write 11 to the right.*)  
Can you use that to work this out? (*Uncover  $7 + 4$ .*)  
Can you use that to work this out? (*Uncover  $7 + 6$ .*)

Stage & Behavioural Indicator	
<b>0 Emergent Counting</b>	Cannot count visible items. The child either does not know the number words or cannot co-ordinate number words with items.
<b>1 Perceptual Counting</b>	Can count perceived items but not those in concealed collections. This may involve seeing, hearing or feeling items.
<b>2 Figurative Counting</b>	Can count concealed items but counting typically includes what adults might regard as redundant activity. For example, child “counts all” rather than “counts on”.
<b>3 Counting-on (Advanced Count-by-one Strategies)</b>	Child counts-on rather than counts from 1 to solve addition or missing addend tasks. The child may use a count-down-from strategy to solve removed items tasks (e.g. $17 - 3$ as 16, 15, 14 – answer is 14.) or count-down-to strategies to solve missing number tasks (e.g. $17 - 14$ as 16 put up one finger, 15 put up another finger, 14 put up another finger – three fingers showing means $17 - 14 = 3$ ).
<b>4 Facile Number Sequence (Use of Part/Whole Thinking)</b>	The child uses a range of strategies not involving count-by-one. For example: a compensation using a known result, adding to ten, commutativity, subtraction as the inverse of addition, awareness of the meaning of “ten” in a teen number. <i>A major milestone in children's mathematical development in which part/whole operations have emerged.</i>

### Base Ten Strategies (BTS)

- (49) Place a four strip horizontally on the table. Ask children to count the dots. Place a tens strip horizontally on the table. Ask children to count the dots. Now place a tens strip horizontally below the four strip. How many dots are there now? Continue adding ten strips to show 24 34 44 54 64 74.
- (50) Ask this question only of a child who has demonstrated facile number (stage 4) on SEAL. Can you work out the answer to  $39 + 28$  in your mind?  $39 + 28$  written on card.

Stage & Behavioural Indicator	
<b>1 Initial Concept of Ten</b>	The child does not see ten as a unit of any kind. The child’s focus is on the individual items that make up ten. A necessary condition for attaining Level 1 is attainment of at least stage 3 in the Stages of early Arithmetical Learning.
<b>2 Intermediate Concept of Ten</b>	Ten is seen as a unit composed of ten ones. The child is dependent on representations of units of ten such as hidden tens strips or open hands of ten fingers. The child can perform addition and subtraction tasks involving tens where these are presented using materials such as covered units of tens and ones. The child <b>cannot</b> solve addition and subtraction tasks involving tens and ones when these are presented as written number sentences.
<b>3 Facile Concept of Ten</b>	The child can solve addition and subtraction tasks involving tens and ones without using materials. The child can solve addition and subtraction tasks involving tens and ones when these are presented as written number sentences.

Based on: Wright, R. *Mathematics Recovery* © Leaders’ Handbook. Lismore, New South Wales: Southern Cross University, 1997.