A GUIDE TO PRECISION TEACHING

PRECISION TEACHING

One of the most effective teaching strategies for ensuring high levels of *fluency* and *accuracy* is Precision Teaching. Precision Teaching involves short one minute tasks to build skills by practising them regularly. It lets you monitor and track the progress the child makes very carefully and make changes to ensure the child is learning as fast as they can. It is not in fact 'teaching' in the full sense but is a tool to help highly effective teaching and support where a child is finding something difficult or where the skill they need to learn needs to be fluent and automatic. Carefully designed tasks allow children to practise key skills until they are fluent. It provides the mechanisms for assessing and monitoring progress.

> **The core of precision teaching is the unique focus on building fluency….fluency or 'true mastery' is 'the fluid combination of accuracy plus speed that characterises competent performance'**
>
> Richard Kubina, Rebecca Morrison, David Lee (2002)
>
>
> **"Literally hundreds of thousands of charted instructional projects have demonstrated the effectiveness of this approach"**
>
> Carl Binder, Cathy Watkins (1990)

The actual tasks the child does are traditionally called 'probes'. Probes are activities the child completes in one minute that allow you to monitor progress towards learning the skill. 'Probes' have been used in many versions of precision teaching for many years to learn in many different skill areas and can take many forms from lists of words that the child is learning to sound out, to number bonds that a child might need to know.

In Sound Progress, a programme available from Kent Educational Psychology Service for developing key literacy skills, the probes are lists of words. There are generally 12 words on each probe, which for three phoneme words gives 36 phonemes on a probe and for four phoneme words gives 48 phonemes. The task is for the child to blend and segment the words easily and automatically.

A teacher who was concerned that a child was not learning to recognise over 10 might write a list of 40 numbers on a sheet of paper. This sheet becomes the probe task and the child is asked to read each one out loud and do as many as possible in one minute.

Probes monitor or *probe* the extent to which the pupil is accurate and fluent in that skill area.

How does it work and what is the evidence base?

The Learning Hierarchy

When a child learns a new skill they first have to **acquire** the skill. This usually involves watching someone else do it or being guided in how to do it. After acquiring the skill the child has to build up **fluency**. Fluency is usually achieved by practising the task until it becomes automatic. Once a skill is fluent or automatic the next challenge is **maintaining** it over time, which involves coming back to the skill from time to time to remember it. Beyond this the child needs to **generalise** so that they can use it in different situations and **adapt** it to different situations. In 1978 Norris Haring and Marie Eaton described these stages in a 'learning hierarchy'.

Adapt

Generalisation

Maintenance

Fluency

Acquisition
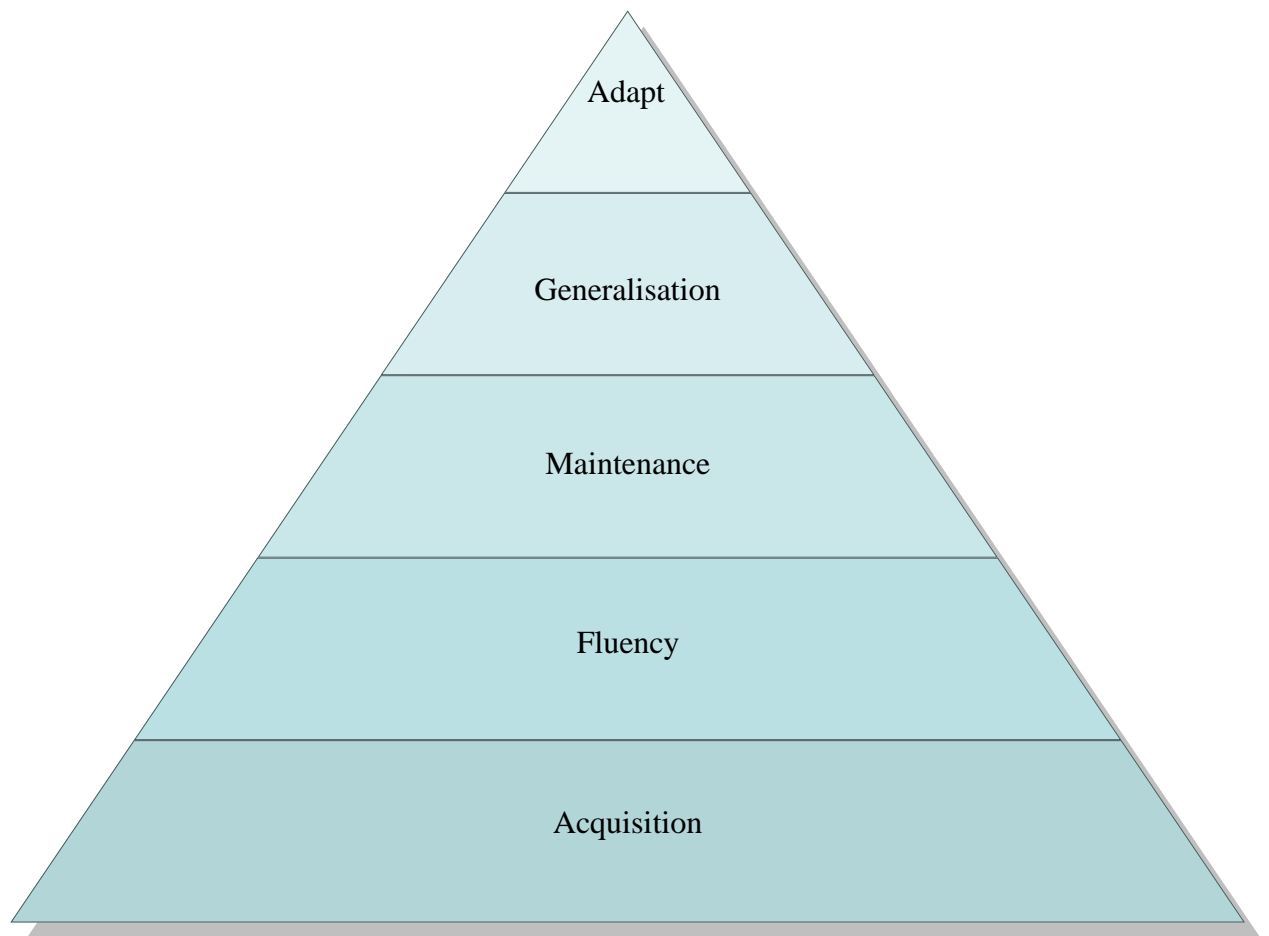
Different skills demand different levels of automaticity. If you hear a short story then re-telling the story can be easy once you have heard it two or three times because the connections your brain needs for this task are wide networks that use lots of different pieces of information. You have to consciously control the process of telling the story. When people learn to play a musical instrument they usually learn specific sequences of notes (scales and arpeggios for example). These need many more than two or three goes to be able to play well because doing it well relies on strong, but relatively simple, connections in the brain that are automatic.

Shiffrin and Schneider (1977) undertook research into memory processes. They can be grouped into "controlled" processes and "automatic" processes.

- Controlled processes result from varied mappings and comparisons between different memory sets. They require attention and can be used flexibly in changing circumstances.

- Automatic processes evolve as a result of practice. They do not affect processing 'capacity' as they do not require conscious attention and they are difficult to modify once they have been learned.

Many skills that children need to learn for literacy and numeracy are things that need a high level of automaticity. These include being able to blend and segment sounds in words and be able to add or subtract numbers quickly.

Why practise so often?

Some researchers called Rea and Modigliani published research in the journal called Human Learning in 1985. This showed that multiplication and spelling test scores are higher following a series of 'expanded' practice test events (short test events separated out) than in the massed test events (all test items in together in a sequence). This early research has shaped a lot of what we know about how to teach and learn skills like this that need to be automatic.

Frank Dempster published research in the journal called the American Psychologist in 1988. Here he found that separating practice sessions, called 'spaced practice' out was much more effective than doing lots of 'massed practice' all together.

John Hattie has more recently looked at a wide range of factors that help learning. John's book called 'Visible Learning' shows that spaced practice makes a huge impact of the effectiveness of learning.

A key thing to remember is that precision teaching will not help a child with generalisation and adaptation (the highest ends of the learning hierarchy). Once a child is fluent in a skill they will need different approaches to help with these aspects of learning.

Even more evidence that it can help children learn effectively!

- **Precision Teaching can help make reading enjoyable.**
  (Kessissoglou & Farrell 1995).

- **It can help you set achievable targets for children's learning.**
  (Downs & Morin 1990)

- **The instant feedback children get can help them learn.**
  (Byrnes, Macfarlane, Young & West, 1990)

- **It is ideal for tasks that need high levels of fluency**
  (Fox, 1982)

- **Precision Teaching can help with maths.**
  (Cheisa & Robertson 2010)

- **Precision Teaching helps with self-concept.**
  (Roberts and Norwich 2000)
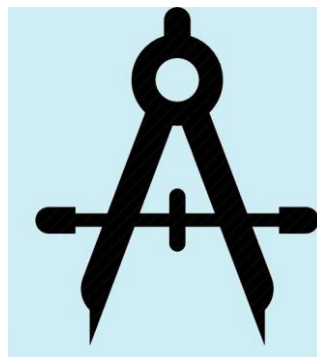
What do you have to do?

The five basic components of precision teaching

- *Specifying desired pupil performance in observable, measurable terms:*

Having decided on the area that you wish the child to start on a precise target must be set which is both observable and measurable.

- *Recording the performance on a daily basis:*

This is done using the probes and recording the child's responses. The child should work on the probe for a short time at least once a day (ideally three times a day), usually for exactly one minute. You can just grab a single minute to practise the probe. You can also take the opportunity to build in a short teaching session in the '10 minute model' where you would teach for 8 min, complete the probe for 1 min and then record the results for 1 min.

- *Charting performance on a daily basis:*

The teacher records the pupil's correct and incorrect rate every time the probe is used, and can then plot this data on a fluency chart. The fluency chart has a ratio scale that shows the relative increase or decrease in a child's performance.

- *Recording teacher behaviour or teaching approach in relation to pupil performance:*

This refers to the planned, systematic changes, which the teacher might make. For example changes may be made in the use of praise, or in the nature of the teaching programme. Task analysis or task slicing may be used.

- *Analysis of the data to determine:*

(i)   *Whether progress is satisfactory;*
(ii)   *Whether changes are needed in teaching approach in order to maintain or accelerate progress.*

The Special Characteristics of probes.

This system of teaching with probes has been developed because the special characteristics that probes have are immensely valuable in helping to ensure the effective teaching and learning of any skills that need to be fluent and automatic. For example all phonemic skills needed for learning to read have to be learnt to a high level of accuracy and fluency.

- They are given (at least) daily, ideally at the same time in the same place with the same materials.

- All items on the probe are written in the same way.

- Items are randomly organised so that the pupil does not just learn the sequence.

- They are given for a very short timed period, usually one minute.

- Rate measurement is used as children's progress is expressed as the number of correct and incorrect responses per minute.

- Extremely small changes in performance can be observed.

- They give information on a child's level of fluency as well as accuracy.

- Probe results give an indication of increasing proficiency on the task being taught. The more fluent a child becomes, the greater the confidence with which we can say the child is approaching mastery.

Adapted from Solity, J.E and Bull, S. (1987) 'Special needs; bridging the curriculum gap', Milton Keynes: OUP

Examples of how you can use probes to help key literacy skills:

	Segmenting	Blending
Pre-text – Pure auditory phonemic awareness.	1. **(Hear – say)** Words are spoken by adult and the child has to say the individual phonemes in each word.	2. **(Hear – say)** Individual phonemes (spoken by adult) are blended by the child and spoken out loud as a whole word.
With text – Mapping phonemes onto letters and letter combinations.	3. **(See – say)** Words (visually presented on paper) are looked at by the child and said out loud.	4. **(Hear – write)** Individual phonemes (spoken by adult) are blended and written down by the pupil.

An example template of a probe sheet that could be used to present a skill is given on the next page.

Pupil………………………………………… Probe time…………………………..
Skill to be increased……. ……………..... . Administrator………………………..
……………………………. ……………..... Advisor………………………………
Aim rate…………………………………… Date…………………………………..

Setting an Aim Rate

Setting an aim rate is dependent on what you are asking the child to do in the probe. In the previous table examples of how you might test (probe) a skill are given. The next table gives approximate aim rates for each probe type as a guide. The aim rate will however depend upon what the skill is that you are testing. For example, hear – write of individual numerals 0 – 10 would have an approximate aim rate of 40 numerals per minute however a hear-write probe of equation writing would be approximately 20 equations per minute because equation writing would take longer than writing an individual numeral.

Probe Type	Provisional Aim Rate
See – Say (e.g. word reading, equation reading)	25 - 50 per minute
Hear – Write (e.g. writing numerals, writing a sound or word)	20 – 40 per minute
See – Write (e.g. completing 2 numeral addition sums)	25 – 30 per minute
Hear – Say (e.g. child says individual phonemes from a word spoken by adult)	25 – 50 per minute

You can check an aim rate by asking a child who is good at the skill to do an many as possible in a minute, or you can base it on previous data from other fluency charts.

An overview of the stages to recording.

The following 9 stages cover the process for working with an individual pupil using the probes, record sheet and fluency chart. It would not necessarily be appropriate to be working at this level with all children. This quite high level of planning and monitoring provides a very detailed programme for pupil which goes beyond the differentiation that is normally available in a classroom.

1) Decide on the target area that the pupil needs to work on. (Addition, multiplication, matching graphemes to phonemes, blending the sounds in cvc words etc.)

2) Decide what specific skill the child needs to practice first and write a probe sheet A fairly small number, ideally up to 5 specific things, should be put on the probe at one time, but can be repeated to give more practise. So if the target area is number bonds to 10 then the specific things on the probe might be 3+?=10, 5+?=10, 1+9=10, 8+?=10 and 2+?=10. These are then be repeated to give the 25-30 per minute that are needed.

3) Teach the skill. This can be done with examples or modelling it for the child in the normal way. Other teaching materials might be helpful such as a whiteboard or other classroom resources.

4) Set up three or more practise sessions per day. At each session work through the probe from the top and complete as far as the child can in one minute.

5) During the minute note number of responses that are correct and incorrect and any errors you might need to note to help with feedback and teaching later (does the child always get the number 7 wrong? Do they get stuck with the sound 'd'?).

6) The number correct and incorrect for that minute can then be plotted on a fluency chart if needed and can also be shared with the pupil to allow them make their own chart of their progress.

7) Build in further teaching sessions as required. This can be done immediately after a probe has been used to look at any errors the pupil may have made while completing the practice task, however you do not have to have a teaching session with every practice session. You can use additional teaching activities that go beyond feedback, modelling and guiding that you would incorporate into your normal teaching if needed.

8) Continue to use the probe in the same way until the aim rate of 90% of the items have been completed successfully for three consecutive sessions or analysis of the data suggests that teaching needs to be changed. (90% is chosen rather than 100% because of the range of factors on any one day that might influence a child's performance such as background noise, how they are feeling that day and what sort of a playtime they had ! 90% ensures a high degree of fluency and accuracy and also makes the target achievable.)

When you complete a probe with a child, or when you practise with a group of children, you will find yourself correcting errors, showing the children what to do yourself, explaining what they did right or wrong, encouraging, reviewing what you have done and getting them to demonstrate what you have explained. This teaching comes naturally, and might mean that a 1 minute probe then has an additional five or ten minutes teaching and discussion with it. The important point is to plan in this teaching time, don't rely on it happening on an ad hoc basis.

Plan specific times that you can use to review how far you have come with the probes, to explain, demonstrate and practice new skills, to get pupils to teach each other what to do, and to use the new skills in real reading and spelling. Sharing the progress they are making by looking at the fluency charts can help children's self-concept enormously. This in turn feeds into their motivation to read more and a sense of success.

THE FLUENCY CHART

As you record the child's performance each time you should try to record the progress using a fluency chart. The fluency chart is an important element in the Precision Teaching system and lets you analyse the way in which the child is learning in great detail.

Using the fluency chart is not as complex as it might seem. First looking at the record form and making a note of the number of responses correct and the number incorrect for each of the columns. These two figures are then transferred to the bottom of the fluency chart page and can then be plotted on the scale.

The scale runs from 0 to 60 and you will notice the unusual spacing of the lines. The scale ensures that a change from getting only 1 correct to getting 2 correct is more significant than a change from 20 to 21. This is important as it reflects how children learn, the higher the overall level of accuracy and fluency the less significant an impact one individual error or one more item correct will be, while in the early stages each extra one is crucial.

Using the fluency chart will not be necessary all the time but consider using the chart when;

- You first start using the probes with a pupil.
- You begin using a new type of probe.
- There has been a break in teaching for any reason.
- You are concerned that progress in not satisfactory

A step by step guide to full assessment and recording for an individual child.

- Record the child's performance each time they complete a probe task.

- Decide whether a fluency chart is needed on the basis of the criteria above.

If it is;

- Mark the pupil's initial correct and incorrect responses on the first point of the graph.

- Make a mark on the chart that represents a 90% correct aim rate. (So for example if the task is to segment 30 sounds the aim rate is set at 90% correct which is approximately 27.)   Make this mark on the chart about 10-15 teaching sessions along the sheet and use this as your aim rate.

- *The point for the aim rate line can be judged once you have more experience of other pupils using the same probe or that child's own performance in the past. If you are unsure about what to set as a realistic aim rate ask a child who can do the task well to have a go and see how many they manage in the minute. Then take 90% of whatever this child achieves and use that figure.*

- Plot the pupil's correct and incorrect responses each time the probe is used.

- Analyse the progress the child makes using the guidance in this pack or speak to your educational psychologist.

Task _____   **Name**_____

Date																

60																60
55																55
50																50
45																45
40																40
35																35
30																30
25																25
20																20
15																15
10																10
9																9
8																8
7																7
6																6
5																5
4																4
3																3
2																2
1																1
0																0

Correct																
Incorrect																

A WORKED EXAMPLE – Sam.

Sam is in year 3 is currently finding addition to 10 very difficult.

His teacher prepared a page of 35 number bonds to 10. These are shown to Sam and the task is to go through and give an answer to as many as possible.

The teacher asks Sam to do as many as possible for exactly 1 minute. Sam has to look at each sum in turn across the page and says the answer out loud.

The teachers says: Ready, Begin (and starts timing).

The teacher uses a sheet or record form to track how many are correct and incorrect. It is important to note which ones were wrong to help the child later, not just the totals.

When exactly 1 minute has gone the teacher notes the point reached by Sam and gives immediate positive feedback.

The teacher then counts the number of correct and incorrect responses.

The number correct and incorrect can then plotted on the fluency chart (see the next page).
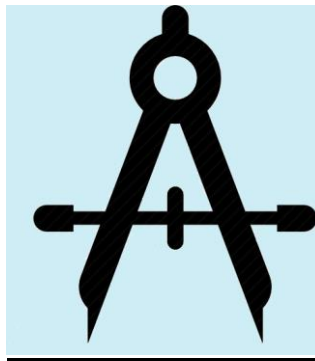
The aim rate was drawn at around 90% of the 35 number bonds on the probe and this was to be achieved in 15 practise sessions.

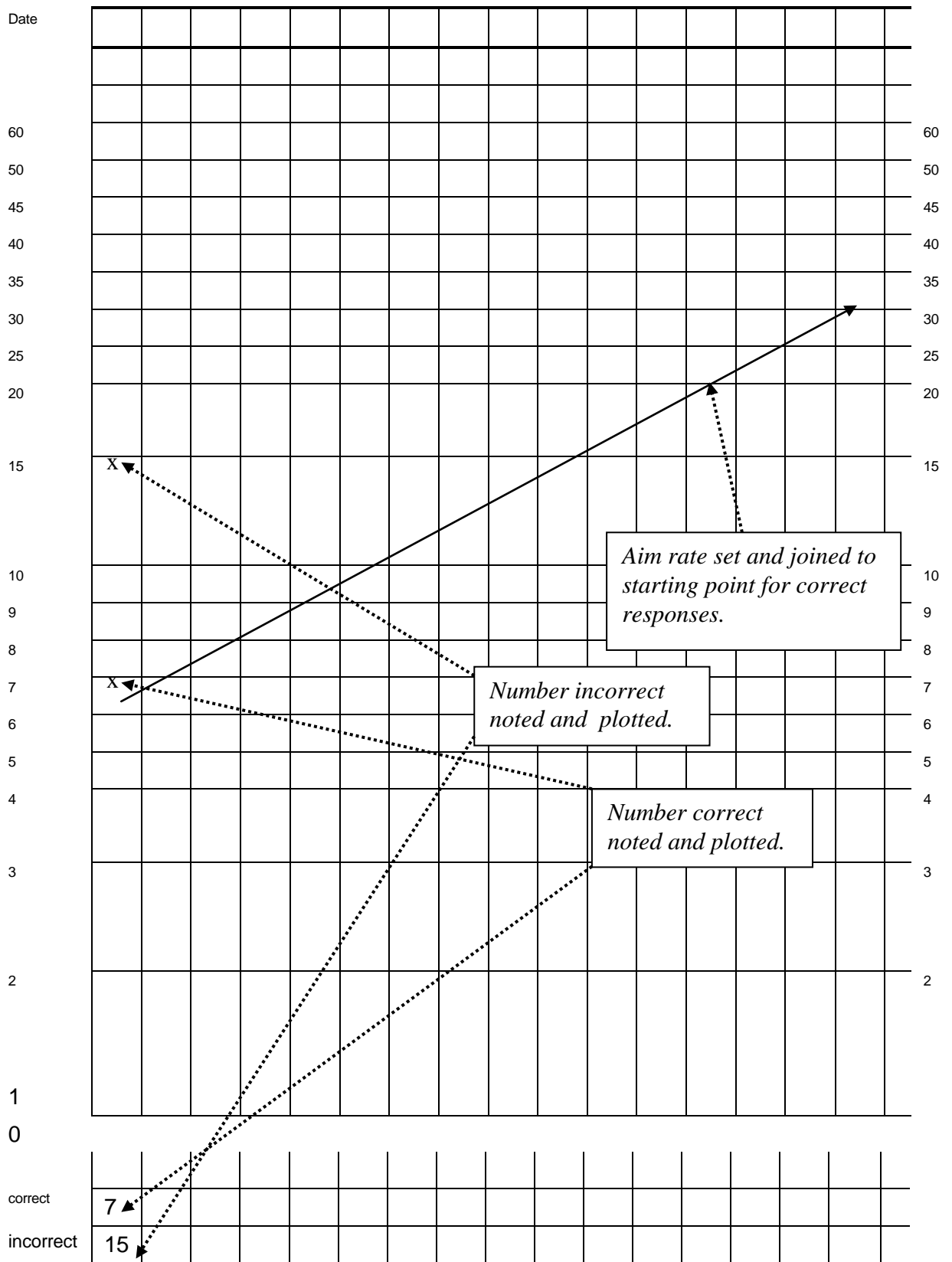| Date										

Aim rate set and joined to starting point for correct responses.

Number incorrect noted and plotted.

Number correct noted and plotted.

correct: 7

incorrect: 15

Kent Educational Psychology Service. 2014.   Contact us at educationalpsychology@kent.gov.uk

This document can be copied and used by all staff in schools who have bought it from EduKent or downloaded it from the NASEN SEND Gateway. We have a website you can use to deliver Precision Teaching for literacy skills: http://soundprogress.co.uk/   Speak to your E.P. about training in how to use precision teaching.

Sam continued to complete the probe three times a day. Each time the probe was used the number of phonemes he got correct and incorrect were plotted.

Date	12	12	12	13	13	13	14	14	14	15	15	15	16				

The 90% aim rate has been reached and ideally will need to be maintained for three consecutive sessions over two days.

Over time the number of incorrect responses has dropped.

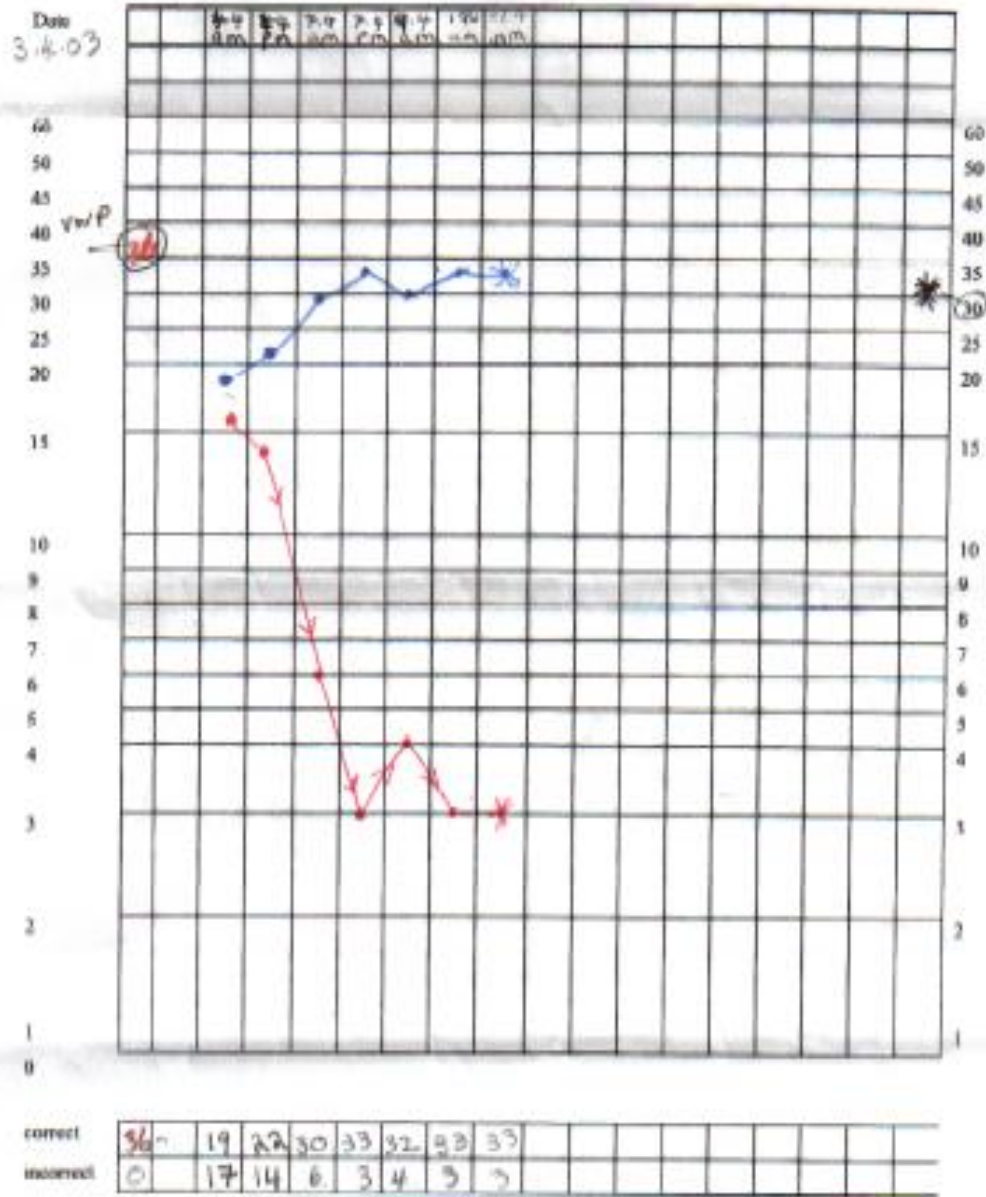|																	
correct	7	8	9	8	9	11	8	16	12	15	22	27	32				
incorrect	15	10	10	9	9	6	5	7	4	3	0	0	0				
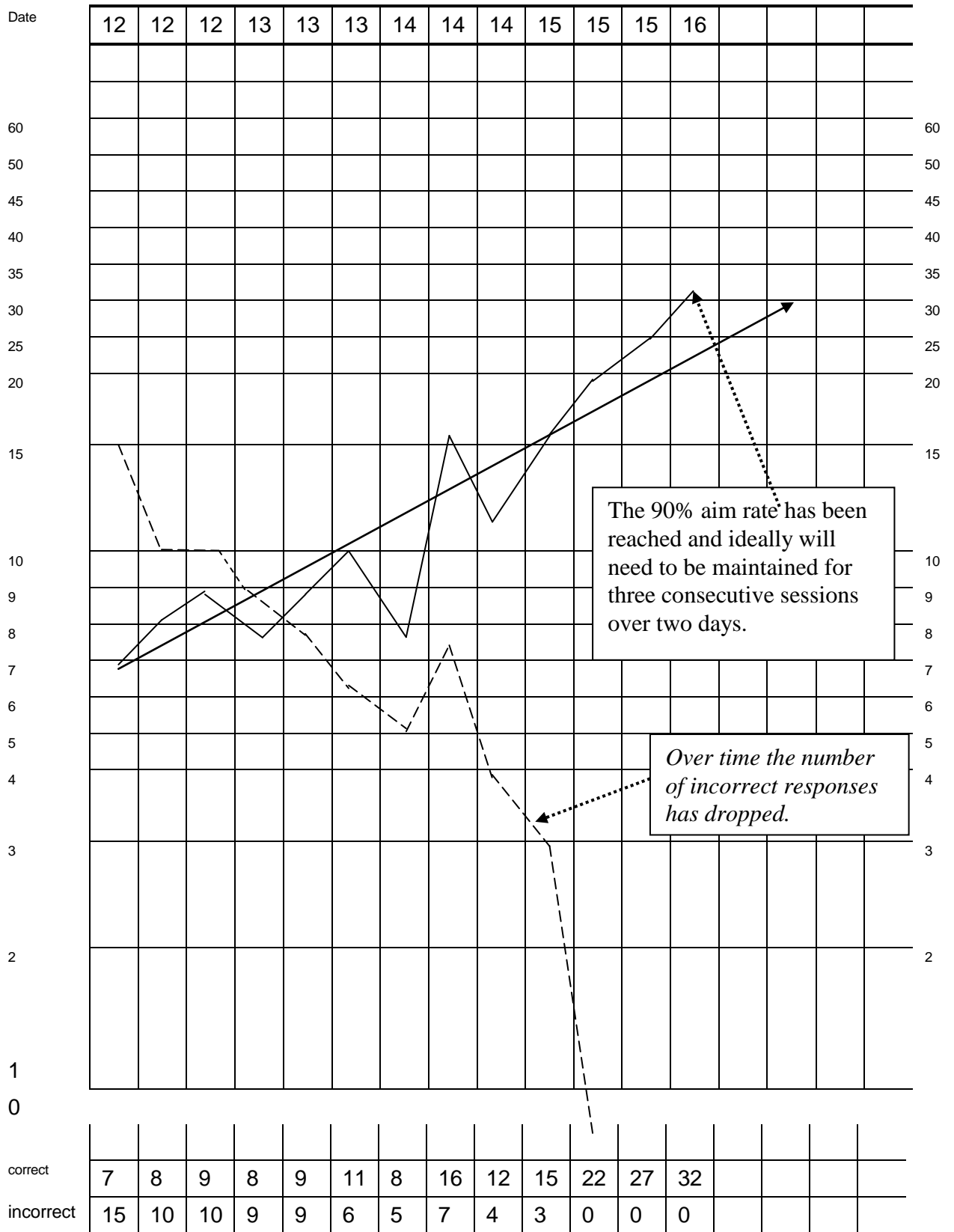
RESPONDING TO DATA ON THE CHART

This is a brief overview - seek further consultation or training from Kent Educational Psychology Service to support your interpretation of the information you get from a frequency chart, particularly where you have ongoing concerns about a child's progress.

- Inspect slope to see if progress is fast enough.

- Consider 'task slicing' if no positive benefits are recorded after 3 days. Task slicing essentially means cutting down the number of words or phonemes that are presented to the child – reducing the amount the child has to learn.

- Consider making a change to the teaching programme if the aim rate is not met after 18-21 attempts (or 6-7 days at three times a day.) It is important to only change one thing at a time, possibly the number of words being used, the time of day the task is completed, who the task is completed with, is the task before or after a break time, where does the task take place or the colour of the paper the probe is photocopied onto. When a change has been introduced it is important to leave things the same for another 18-21 attempts to see if it has any effect.

- The aim rate should be maintained for 3 consecutive practise sessions spread over two days to be sure that the skill is established.

- The pattern on the graph will typically show an **'error reduction'** phase, where the number of errors drop, followed by an **'increasing fluency'** phase which will show the rate correct in the minute going up. There is an important third phase which is **'applying the skills'** and, if looking at reading skills for example, this would need to be focused on when;

  - Hearing children read,
  - Looking at books/text with the whole class,
  - Practising with groups or with the whole class,
  - Teaching pupils to use phonemic strategies for spelling and acknowledging valid phonemic alternatives to the correct spelling as a good strategy.
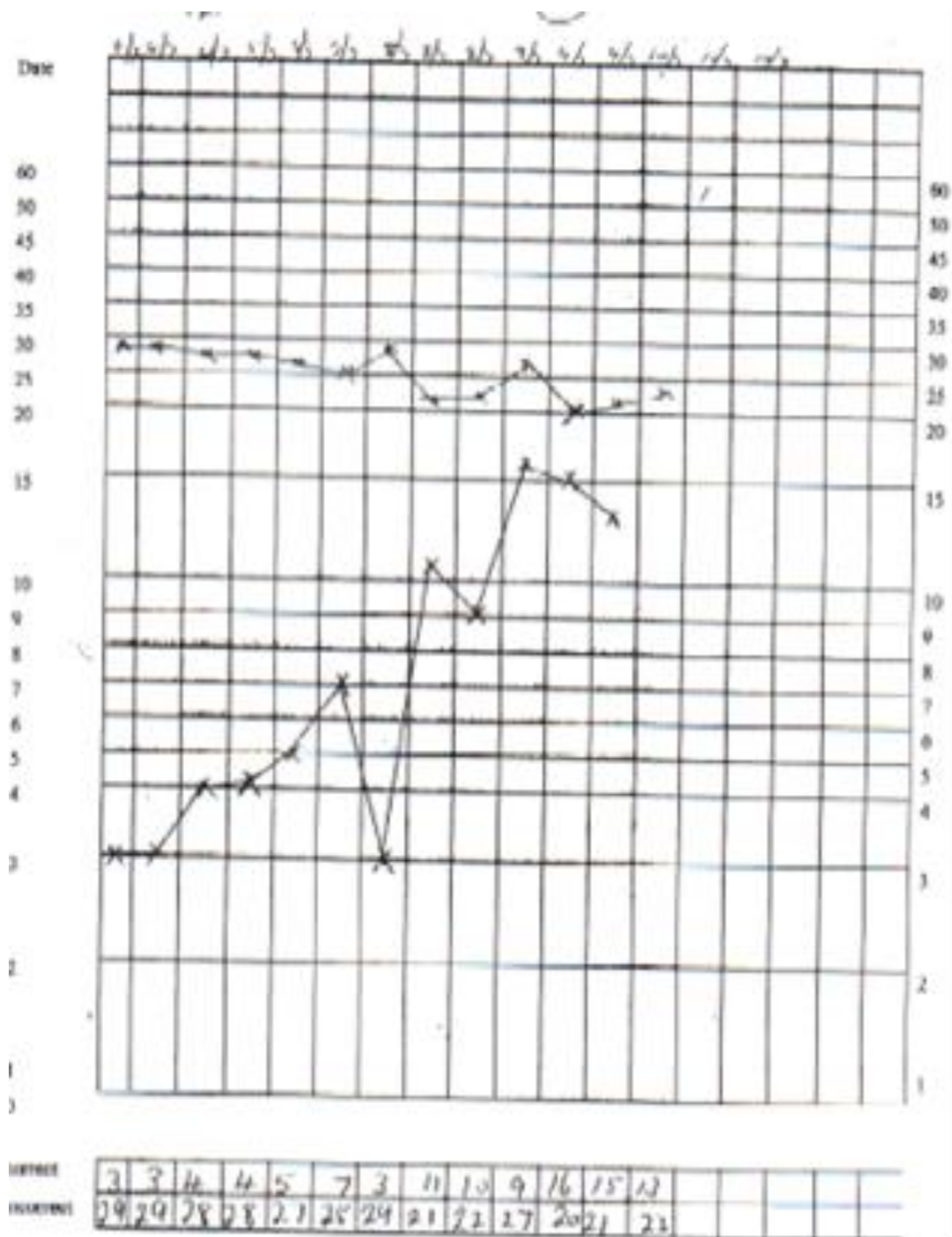
The next pages show four examples of completed fluency charts from schools. They all show what a chart might look like as you are practising the skills with a child. Note that in these examples the teachers have not set an aim rate, which although not essential would be important if you had ongoing concerns about the rate of progress a child was making over time.

Initial Auditory Processing. 4A① + ② final.

Fluency Chart Example 1.

In these two cases a crossover in the first few practise sessions can be seen clearly.

This pattern is very positive and shows that although the task was challenging at first the child has increased their performance and mastered the skills with these sounds.

Date 3.4.03

correct	36	19	22	30	33	32	33	33									
incorrect	0	17	14	6	3	4	5	5									

Fluency Chart Example 2.

The general picture here is positive with the number of incorrect falling and the number of correct rising.

A point to note though is that when the child started they were already getting more right than they were wrong. Maybe a harder the task could have been more challenging?

Date

Correct: 3, 3, 4, 4, 5, 7, 3, 11, 10, 9, 16, 15, 13

Incorrect: 29, 29, 28, 28, 23, 25, 24, 21, 22, 17, 20, 21, 21

Fluency Chart Example 3.

Here the child's performance is improving, but only very gradually. The number of correct responses is rising and incorrect falling but there has been no crossover yet.

This could be an indication that the current level is too hard and earlier skills have not been mastered.

Some other patterns to look out for.

Chart Picture	Interpretation	Probable Intervention
More errors than correct: no sign of a 'switch' _ ⟶ + ⟶	Task inappropriate (If no change in 3 days the task is not appropriate – the '3 day rule'.)	Reduce or slice the task
Surprising change within first 3 days. + ✕ _	Task possibly inappropriate. Monitor progress; this may just be a 'blip'.	You may need to reduce or slice task if the trend does not change soon.
Both correct and incorrect rates increasing ↗ + _	The child is merely getting faster, they are attempting more on the probe without getting more accurate.	Slow the child down: encourage accuracy before speed.
Some progress; accurate but shallow correct rate slope. + _	The task seems to be appropriate, but progress is not fast enough.	Increasing motivation through rewards/ incentives, or alter teaching methods.

Using the approach over time.

- Make sure you spend some time explaining the skills to children in other ways as well, don't _just_ do the probes. This is more important in the early stages when the basic skills are new.

- Watch the three day rule : if there is no progress or you see a 'blip' in the trend lines that lasts for more than three days don't persist with what you are doing – change it slightly.

  - Slice the task (reduce the teaching content) by, for example if reading only use five different words instead of ten but repeating those five so that there can still be an aim rate of say 20 per minute.

  - Reduce the number of items on the probe so that the aim rate is lowered.

- Once the child is fluent you will need to look carefully at how this is being generalised and applied in other areas.

  - Think about whether they can do the task on their own without you there. See if they can show another pupil how to do it, can they work on the task with another pupil, can

they apply it in their writing and reading when working with other adults or working on their own. Make this a specific target where you feel it is not happening quickly enough.

❑ What rewards or incentives might help in using the skills more widely in the classroom ? Is there an need to support the child's motivation for reading and writing as well as teaching these underlying skills.

❑ How could you and others who work in the school prompt the pupil to use these skills in other places and at other times? How can you let them know what the child has achieved and what they should be trying to generalise and apply in other lessons and in other contexts?