Biology: Scaffolding Writing

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This Lesson Study case study was completed as part of the Department for Education (DfE, UK) nasen Universal SEND programme.

Abstract
Context: This study examines the implementation of a Lesson Study focused on improving extended writing for two high-attaining pupils with special educational needs and disabilities (SEND) in a mainstream secondary school biology curriculum. The study incorporates structured scaffolding techniques to enhance writing skills, particularly in the context of a gradual release teaching model.

Aims: The primary aim is to investigate the effectiveness of various scaffolding strategies, including writing frames and collaborative learning approaches, in aiding pupils A and B to improve their extended writing capabilities. The study also seeks to explore how the findings might be applicable across different subject areas beyond biology.

Methods: The Lesson Study is structured across three weeks, with one lesson conducted each week. The study employs a series of scaffolding tools, such as an acronym Writing Frame specifically designed for natural selection, and the Structured Evaluation Scaffold, integrated within the 'I do, we do, you do' framework. Data collection focuses on pupil performance and engagement with these scaffolding techniques.

Findings: The results indicate that both pupils benefitted from the scaffolding strategies, although to varying degrees. Pupil A demonstrated increased independence and progress in writing through the use of a BrailleNote Touch Plus device for real-time feedback, enabling on-the-spot clarification of misconceptions. Pupil B, who is verbally articulate, thrived through collaborative discussions in 'think-pair-share' activities, leading to greater confidence in her writing.

Implications: The insights gained from this study suggest that the application of structured scaffolding can significantly enhance writing abilities in pupils with SEND. The varying responsiveness to the scaffolding techniques highlights the importance of individualised approaches within inclusive education. Furthermore, the strategies employed in this study may provide useful frameworks for other educators looking to support similar learners in diverse subject areas.

Keywords
Inclusion, special educational needs and disabilities; scaffolding; biology; writing skills; universal offer

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Lesson Study for Inclusion and Special Educational Needs and Disability (ISEND): Case Study

Biology: Scaffolding Writing

Embedding structured scaffolds—such as writing frames, Think–Pair–Share, and the Structured Evaluation Scaffold—within a gradual release model ('I do, we do, you do') enabled two high-attaining Year 10 pupils with SEND to improve extended writing in biology (Mainstream, Secondary).

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BACKGROUND INFORMATION

Type of setting	Medium-sized, Maintained, Catholic High school (age 11-18)
Case study pupil(s)	**Pupil 1: male, 15 years old** Visually impaired, high-attaining; however, he sometimes does not write enough to gain a higher mark on exams and needs to develop the structure in his writing. He finishes tasks quickly and needs to remember to check through his work before moving on to another task. He uses a braille machine to write answers and interprets information through the touch of embossed paper. He enjoys Biology and is keen to continue the subject at A-level. **Pupil 2: female, 15 years old** High attaining; is working on being more focus and less distracted. She needs to work on start tasks and reducing the time she is off-task because she doesn't understand the next step required. Her most used strategy is to seek reassurance from other pupils. Pupil 2 has dyslexia and will receive access arrangements for exams (extra time). She has glasses, but dislikes wearing them. She also enjoys Biology and is keen to continue it at A-level.
Roles of the Research Team	- Lesson facilitator - Lesson observer 1 - Lesson observer 2

LESSON STUDY STEPS

See Appendix 1 for the Lesson Study Steps

Ethical consent has been considered to publish this data anonymously; it was deemed normal classroom practice, and all data is anonymous.

LESSON STUDY SUMMARY

Research focus	Scaffolding, extended writing, Biology, special educational needs and disability (SEND), writing frames
Research question	How can scaffolding encourage pupils identified as having SEND to improve their structure on long-answer biology questions by using writing frames?
Overview/Key information	This case study explores how barriers to learning were addressed to support two high-attaining Year 10 pupils with SEND—one with visual impairment and one with dyslexia—in improving extended writing in biology. The teaching team employed a blend of targeted and universal strategies, including the VASBP writing frame, Structured Evaluation Scaffold, Think–Pair–Share, and the 'I do, we do, you do' model. Over three lessons, pupils practised applying scaffolds to increasingly complex tasks. Live marking provided immediate feedback, particularly benefiting the pupil using a BrailleNote device. While both pupils made progress, they did responded differently: one gained independence through structured support, while the other thrived through peer interaction and verbal rehearsal.
Evidence-informed practice	Embedding structured scaffolds—such as writing frames, Think–Pair–Share, and the Structured Evaluation Scaffold—within a gradual release model ('I do, we do, you do') enabled two high-attaining Year 10 pupils with SEND to improve extended writing in biology.

KEY LITERATURE SHAPING THE LESSON STUDY

Reference	Vygotsky, L. S. (1978). *Mind in Society: Development of Higher Psychological Processes* (M. Cole, V. Jolm-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press. https://doi.org/10.2307/j.ctvjf9vz4
Key point(s) of note	Vygotsky says that learning and development happen through social interaction. He says that more experienced people, such as the teacher, help to guide a child's learning in areas where they can improve with support, called the *zone of proximal development*.

Reference	Somaratne, R. T. (2024). Fisher, D., Frey, N. (2021). Better learning through structured teaching: A framework for the gradual release of responsibility (3rd ed.). *TESOL in Context*, *32*(2), 67–70. https://doi.org/10.21153/tesol2024vol32no2art1843

Key point(s) of note	Providing scaffolds for pupils to learn through guided practice using the model of ‘I-do, we-do, you-do’, then removing the scaffold after some time to increase independence and progress.

Reference	Rappolt-Schlichtmann, G., Boucher, A. R., & Evans, M. (2018). From Deficit Remediation to Capacity Building: Learning to Enable Rather Than Disable Students With Dyslexia. *Language, Speech & Hearing Services in Schools*, *49*(4), 864–874. https://doi.org/10.1044/2018_LSHSS-DYSLC-18-0031
Key point(s) of note	The paper suggests helping students with dyslexia by using scaffolds to give support, but then later removing them. The scaffold could boost their confidence and improve progress.

Reference	Jung, C., Mehta, S., Kulkarni, A., Zhao, Y., & Kim, Y.-S. (2022). Communicating Visualizations without Visuals: Investigation of Visualization Alternative Text for People with Visual Impairments. *IEEE Transactions on Visualization and Computer Graphics*, *28*(1), 1095–1105. https://doi.org/10.1109/TVCG.2021.3114846
Key point(s) of note	The paper looks at how to describe visual data for people with visual impairments using text. It focuses on writing clear ‘alt text’ to make data easier to understand without visuals. The review shows the need for teacher training and support to help these students learn effectively. They state that some students with visual impairment in mainstream schools are gifted but are ‘unidentified and overlooked’.

Reference	Aubin, G. (2022, September 22). *Scaffolding – more than just a worksheet*. Education Endowment Foundation. https://educationendowmentfoundation.org.uk/news/scaffolding-more-than-just-a-worksheet
Key point(s) of note	**Scaffolding is temporary support**: It’s a metaphor for providing just enough help so pupils can complete tasks they couldn’t do independently. Crucially, it should be removed once it’s no longer needed. **Forms of scaffolding**: It can be visual (e.g. task planners), verbal (e.g. correcting misconceptions), or written (e.g. writing frames). It’s not limited to differentiated worksheets. **Avoiding over-support**: The blog warns against keeping scaffolds in place for too long, as this can hinder independence. Teachers should plan for how and when scaffolds will be reduced or removed. **Part of high-quality teaching**: Scaffolding is one of the EEF’s ‘Five-a-day’ strategies for supporting all pupils, including those with SEND.

	When used well, it becomes part of the ordinarily available offer, not an add-on. **Teacher workload**: Effective scaffolding supports adaptive teaching without requiring teachers to plan multiple versions of lessons.

TIMING OF LESSON STUDY ACTIVITIES

We ran the three Lesson Study Activities over a three-week period, one lesson per week.

Lesson Study Cycle 1

Ordinarily Available Provision

We embed the 'I do, we do, you do'[1] model, a form of explicit instruction, into our teaching as part of our ordinarily available inclusive universal offer.

Targeted Provision: Assess, Plan, Do, Review

To support Pupils A and B to write more structured answers to long-form biology questions, we provided the following 'additional to and different from' scaffold:

Scaffold 1. Introduced the 'VASBP – Writing Frame for Natural Selection' acronym scaffold.

- **V – Variation**: What variation in the species is there?
- **A – Adaptation**: Which adaptation is advantageous and why?
- **S – Survive**: Which individuals will survive and why?
- **B – Breed**: Who is more likely to pass on their genes?
- **P – Pass on genes**: What will the population look like in future generations?

Review and Planning

Lesson

Research lesson timing	Teaching activity (if stages)	Student activity	Observation focus
5 minutes	Modelling 'I-do'	Note taking	Learning the scaffold writing answers on natural selection using the acronym of **'VASBP'.**
5 minutes	Modelling 'we-do'	Question and Answer (Q&A)	Thinking how they would answer the question, providing answers when necessary on peppered moths. For example:

[1] The **'I do, we do, you do'** model is a structured teaching approach aligned with the Gradual Release of Responsibility framework.

- **I do**: The teacher models the skill or concept, demonstrating and explaining while learners observe. This phase is teacher-led and focuses on clear instruction.
- **We do**: The teacher and learners work together, often through guided practice. The teacher supports learners as they begin to apply the skill collaboratively.
- **You do**: Learners independently apply the skill or concept, demonstrating understanding and autonomy. The teacher monitors and provides feedback as needed.

This approach helps scaffold learning, gradually building learners' confidence and competence.

			Teacher: "what would the variation be in this population of moths?" Teacher: "Which adaptation is more advantageous to the moths in urban environments?"
10 minutes	Modelling 'you do'	Answering the question	Pupils should **apply their knowledge of the scaffold to a new scenario** of natural selection on voles in their book or on their BrailleNote Touch Plus computer.

Post Lesson Review

Pupil A

We expected pupil A to take part but to type out his answer quickly on his BrailleNote Touch Plus and sit without checking his work. However, he took his time to type out his response using his BrailleNote Touch Plus; he worked mostly independently and didn't ask the Teaching Assistant for support. He was then encouraged to read his answer to the teacher. His answer was factually sound and structured, including full stops.

Pupil A found it useful to understand how marks were being awarded and utilised the **acronym scaffold** effectively. Although he found the concept of the vole in the scenario hard to relate to.

Pupil B

Pupil B needed encouragement to start the task and was redirected back to the task several times. She eventually completed the task but needed 1:1 support to help her progress. She struggled to apply her knowledge of the **acronym scaffold** to a new scenario, despite knowing the steps. Pupil B was indifferent and said she felt confused by what was expected of her.

Teachers' review

Following this session, we planned to increase the cognitive demand for Pupil A by providing an '**evaluate**' question rather than a 'describe' question.

For Pupil B, we thought changing her seat would help improve her concentration, as she appeared easily distracted throughout, despite the cognitive load being broken down into steps for her.

For both pupils, it was considered beneficial to introduce the scaffold during a dedicated session, followed by opportunities to practise using it. The scaffold will therefore be implemented through a phased, two-stage process across two lessons: the first focusing on introduction and familiarisation, and the second on guided practice and application.

Lesson Study Cycle 2

Ordinarily Available Provision

We embed the 'I do, we do, you do' model, a form of explicit instruction, into our teaching as part of our ordinarily available inclusive universal offer.

Targeted Provision: Assess, Plan, Do, Review

To support Pupils A and B to write more structured answers to long-form biology questions, we provided the following 'additional to and different from' scaffold:

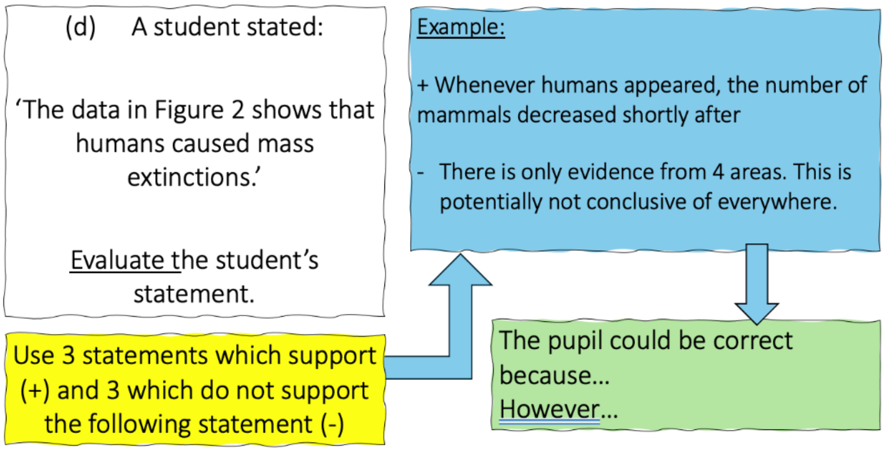
Scaffold 2 - We introduced the think-pair-share approach.

Think–Pair–Share is a collaborative learning strategy that encourages pupils to engage with a question or topic through three stages:

1. **Think**: Pupils take time to consider a question individually, developing their own ideas or responses.
2. **Pair**: They then discuss their thoughts with a partner, comparing ideas and refining their understanding.
3. **Share**: Finally, pairs share their insights with the wider group or class, promoting collective learning and discussion.

This strategy supports inclusive practice by giving all learners time to process, reducing pressure, and encouraging participation—especially helpful for learners with SEND or those who benefit from structured interaction.

Scaffold 3 – In preparation for use in the following lesson, we introduced a Structured Evaluation Scaffold.



Structured Evaluation Scaffold

Structured: The activity provides a clear format for pupils to follow—three supporting points, three opposing points, and a balanced conclusion. This helps guide their thinking and writing.

Evaluation: The task asks pupils to assess the validity of a claim using evidence, which is a core skill in evaluation.

Scaffold: It supports learners by breaking down the evaluation process into manageable steps, making it accessible for a range of abilities, including those with SEND.

Research lesson timing	**Teaching activity (if stages)**	**Student activity**	**Observation focus**
5 minutes	Modelling 'I-do'	Listening/watching how to use the ***Structured Evaluation Scaffold*** to answer and evaluate a question. Pupils were told to observe the marks awarded; if the marks were six, they should write 6	Learning the scaffold writing answers for 'evaluate questions'. Pupils then had to observe the figure and interpret the question they were given.

		points, half supporting the statement, and half disagreeing. The teacher gave examples for both.	
2 minutes	Distribution of materials	Pupils given the following question along with a figure '*The data in Figure 1 shows that humans caused mass extinctions. Evaluate the student's statement*'.	Pupils to observe the information they have been provided with. Pupil A was given sentence descriptives of the accompanying figure.
5 minutes	**Think-pair-share** 'we-do'	Pupils given time to **think, pair-share** with their neighbour. They were asked to find points which: - agree with the student - disagree with the student	Pupils should be **working with a peer to verbally talk through the question**, finding supporting statements and statements which would disagree using the information provided in the figure.
5 minutes	Modelling 'we do'	Pupils were instructed to briefly write notes of their ideas to help them later.	Pupils recorded their notes in their books or Braille machine.
3 minutes	Modelling 'we do'	Using the **Structured Evaluation Scaffold,** pupils were shown how they could use their notes to form a complete, structured answer. This would be a task for the next lesson.	Pupils engaged with the **Structured Evaluation Scaffold**.

Post Lesson Review

Pupil A

The question chosen was adapted for Pupil A. He was given **descriptors** of the figure, rather than a visual, as this is what he would be given in a GCSE exam. As a result, it took him longer to access the information, although under exam conditions, he would receive 100% additional time to give him the same opportunities to succeed.

He was more reluctant and more dependent on the Teaching Assistant than in the first lesson, appearing distracted at times as he couldn't be as independent as he wanted. However, he was able to interpret valid points and come up with alternative hypotheses to back up his ideas.

Pupil B

Pupil B appeared more focused in this lesson. She was able to 'think outside of the box' more than her peers and, similarly to Pupil A, produced valid points which were not the typical answer. She was able to **talk through her ideas more with a peer**.

Teachers' review

Pupil A was less independent and more reliant on a Teaching Assistant. He did reach valid points, which would help him at a later date, but it was facilitated by an adult.

Pupil B appeared to take the lead and was **keen to discuss with her peers**, probably because she enjoys socialising with others. As she was not expected to write down her answer in full sentences, she was able to use the small dual-coded markers (+ symbols for supporting and – symbols for disagreeing) featured on the **structured evaluation scaffold,** she appeared more willing to take part in the task.

Pupils were expected to produce an answer which would be well-balanced, including support for the statement and non-supporting statements.

Lesson Study Cycle 3

Ordinarily Available Provision

We embed the 'I do, we do, you do' model, a form of explicit instruction, into our teaching as part of our ordinarily available inclusive universal offer.

Targeted Provision: Assess, Plan, Do, Review

To support Pupils A and B to write more structured answers to long-form biology questions, we provided the following 'additional to and different from' scaffold:

Scaffold 2 – Continue with the use of the think-pair-share approach.

Scaffold 3 – Students to use the Structured Evaluation Scaffold, which was introduced in the previous lesson.

Research lesson timing	Teaching activity (if stages)	Teaching activity (if stages)	Student activity
2 minutes	Modelling 'we do'	Pupils were asked to remind themselves what was required of an evaluation question. They were given time to **think and pair-share** (i.e., talk through their answer with a partner).	Pupils discussed with their neighbours and made a note of their ideas in pairs.
6 minutes	I do	Using the **Structured Evaluation Scaffold,** pupils are given time to write out their answer to the same question from Lesson 2: '*The data in Figure 1 shows that humans caused mass extinctions. Evaluate the student's statement*'. They were encouraged to draft their answer to show supporting statements and non-supporting statements first.	Pupils wrote out their answers using their books or their BrailleNote Touch Plus.

2 minutes	I do	Pupils were given a mark scheme on the board and asked to self-assess their answers.	Pupils read back through their answers and used the mark scheme to award

Post Lesson Review

Pupil A

He didn't appear to make any individual notes at first **(think)**, but did talk to his neighbour and the Teaching Assistant sitting next to him **(pair)**. Using 'live mark'[2], he **shared** his answer with the classroom teacher on his machine, who encouraged him to add additional content to his work. His answer appeared well-structured, and he used key terminology. He reflected on his work when the classroom teacher looked at it, then addressed the feedback and added additional points. Pupil A added points raised on the mark scheme when it was read from the board.

Pupil B

Managed to write in full sentences, including points which supported and refuted the statement. She did check with a peer **(pair)** to confirm one of her 'against' arguments. She seemed disheartened if what she had written was not exactly what the mark scheme said.

Teachers' review

Pupils have started to produce well-structured answers, which follow the writing framework given. They seem to have gained confidence as they appear more independent and less distracted.

CONCLUSIONS AND NEXT STEPS

- This Lesson Study yielded insights into how to support these pupils across different subjects. Although they were being taught Biology, the idea of **scaffolding extended writing** is transferable to other subject areas.
- Building on our ordinarily available provision (I do, we do, you do) through the use of '**think-pair-share**', the **VASBP – Writing Frame for Natural Selection,** and the **Structured Evaluation Scaffold** enabled both Pupils A and B to become more independent and answer higher-demand questions. Although it should be noted that Pupil A and B, didn't benefit from the same scaffolds in equal ways.
    - *Pupil A*: our understanding of the **BrailleNote Touch Plus device increased**. We started making better use of the device to **'live mark'** by asking Pupil A **to produce text on the screen that could be read out during the lesson**. This allowed us to address any misconceptions on the spot and increased Pupil A's progress with his extended writing.
- *Pupil B*: is verbally articulate, so giving opportunities to **'think-pair-share'** played to her strengths.It appears to have given both pupils confidence in their writing, which they lacked previously. They would previously have written the minimum required.

[2] **Live marking** refers to a formative assessment strategy where the teacher provides immediate feedback to pupils during the lesson, often while they are working. Instead of marking work after the lesson, the teacher moves around the classroom, checking pupils' understanding and offering guidance in real time.
Key features include:
- **Timely feedback**: Pupils can correct misconceptions straight away.
- **Dialogue-based**: Teachers may ask probing questions or prompt deeper thinking.
- **Adaptive support**: Enables teachers to adjust instruction based on pupil responses.

Appendix 1 – Lesson Study Steps

Plan and Study	1.	Select the case study pupil(s) (1 or 2) and decide on the curriculum focus (i.e. Dance, Maths, etc.).
	2.	Arrange who will be in the Lesson Study team.
	3.	Decide on the research question relevant to the Lesson Study. For example, 'How can we increase the engagement of two pupils with autism in Dance?'
	4.	Shape and develop the **Lesson Study** based on research literature. For example, draw on research from the Education and Endowment Foundation, or an academic journal, such as the British Journal of Special Education, or the Journal of Special Educational Needs (JORSEN). NB. Steps 3 and 4 may happen in conjunction with one another, or the Lesson Study team may wish to conduct Step 4 before 3.
	5.	Set the timeline for the Lesson Study. For example, three dance lessons running over a three-week timeframe.
Review and Plan	6.	**1 of 3**: Conduct Review and Planning meeting Decide on the 'additional to and different from' provision that will be embedded for each pupil. Remember, the provision needs to lead towards answering the research question (see Step 3 above).
Teach	7.	Teach **1st** Research Lesson: jointly observe and assess the case study pupil(s). Focus on the efficacy of the 'additional to and different from provision' put in place for each case study pupil. Post-lesson interview with case study pupil(s)
Review and Plan	8.	**2 of 3**: Conduct Review and Planning meeting. Focus on what went well and what needs amending/what the next step is. Based on the review, decide on the 'additional to and different from' provision that will be embedded in the next Lesson Study for each pupil.
Teach	9.	Teach **2nd** Research Lesson: jointly observe and assess the case study pupil(s). Focus on the efficacy of the 'additional to and different from provision' put in place for each case study pupil. Post-lesson interview with case study pupil(s)
Review and Plan	10.	**3 of 3**: Conduct Review and Planning meeting. Focus on what went well and what needs amending/what the next step is.
Teach	11.	Teach **3rd** Research Lesson: jointly observe and assess the case study pupil(s). Focus on the efficacy of the 'additional to and different from provision' put in place for each case study pupil. Post-lesson interview with case study pupil(s).
Review and evaluate	12.	Review and evaluate Lesson Study; focus on case study pupil(s) learning and progress, and the efficacy of the 'additional to and different from provision'.