Literacy

UKLA

What happens when adolescents meet complex texts? Describing moments of scaffolding textual encounters

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Abstract

Adolescents face complex texts rich in academic language. Existing research has documented how teachers can design curriculum to scaffold students' comprehension of complex texts, but little work has documented the moments of adolescents' encounters with complex texts, and how teachers can scaffold these encounters on a moment-to-moment basis to advance their students' comprehension. We present data from an intervention in which six tutors were trained in an interactional scaffolding framework aligned with text complexity read complex texts with small groups of Year 12 students (age 16–17) in a US high school. Tutors used identical texts and lesson plans across groups, but each tutor scaffolded contingently to each group's needs. Findings revealed missed opportunities for deeper scaffolding when tutors failed to recognise the complexity of the text and failed to contextualise their scaffolds within the context of the passage under study. We also found examples of tutors taking different routes to scaffolding success contingent on the students' attempts. We present a menu of scaffolds to support teachers' practice and examples of the scaffolding for teachers and researchers to see how these scaffolds can help navigate complex texts.

Key words: scaffolding, text complexity, reading comprehension, secondary language arts, planned scaffolding, interactional scaffolding

Adolescents face complex texts rich in academic language. Consider the following sentence from neurologist–author Oliver Sacks' *An Anthropologist on Mars* in which Sacks articulates the contributions of Scottish scientist James Clerk Maxwell:

> [Maxwell] formalized the notions of primary colors and color mixing by the invention of a color top (the colors of which fused, when it was spun, to yield a sensation of gray), and a graphic representation with three axes, a color triangle, which showed how any color could be created by different mixtures of three primary colors.

To comprehend this sentence, readers must grapple with syntactic complexity, academic language and specific vocabulary. In addition, students encounter complex scientific content – not just Maxwell's scientific contribution but also his scientific methods. All of this needed knowledge is layered atop students' existing everyday knowledge about colours. These layers of complexity meet our definition of a complex text: one that challenges students with complex conceptual knowledge (Goldman and Lee, 2014; Hattan and Lupo, 2020) and that is rich with academic language used by experts in disciplines to precisely convey the complexity of those ideas (Uccelli et al., 2015). While a reader's tasks and purposes for reading are also part of the complexity of a text, we focus on conceptual and linguistic complexity.

Now consider the contrasting responses of two Year 12 students in a US high school asked to paraphrase Sacks' sentence. 'Allison' said, "So when it came to mixing colors and primary colors, he created the color top which mixed them all and then created a variation of gray". On the other hand, her classmate 'Carrie', in a different group, simply said, "He's pretty smart." These two students represent an enormous range of potential understandings, and even Allison simplifies shades of meaning in Sacks' original sentence. How can teachers potentially scaffold both Allison and Carrie towards a more nuanced understanding?

Defining the problem for research and practice: scaffolding and text complexity

In the United Kingdom, the Education Endowment Foundation (EEF) lists developing students' ability to read complex texts across disciplines as one of its seven major recommendations for improving adolescent literacy (EEF, 2019). In the United States, the Common Core State Standards include an anchor standard about text complexity that spirals across grades.

Though complex texts can be comprehension catalysts, increasing text complexity without increasing instructional support could be a recipe for frustration (Amendum et al., 2018; Hiebert and Mesmer, 2013).

For educators trying to support students reading complex texts, one form of such support could be instructional scaffolding. Scaffolding can be *planned*, through lesson plans and curricular tools prepared before students encounter texts, or *interactional* support based on learners' emerging understanding during the textual encounter (Athanases and de Oliveira, 2014; Hammond and Gibbons, 2005). Much existing research about scaffolding and text complexity for adolescents has examined planned scaffolding. For example, a line of planned scaffolding research on text selection shows how teachers can identify complex target texts, select informational texts and engaging texts to build background knowledge, and align these texts with disciplinary conventions (Elish-Piper et al., 2014, Lupo et al., 2018, Lupo et al., 2019). Similarly, a long-standing body of interactional scaffolding research demonstrates the importance of using structures for conversation and discussion to build comprehension (e.g. Nystrand, 2006; Palincsar and Brown, 1984). We expand these existing bodies of research by focusing on the moment-to-moment interactional scaffolding decisions – like those faced by Allison's and Carrie's teachers.

Existing research on interactional scaffolding shows its promise in supporting students' reading comprehension (Reynolds, 2017; Van de Pol et al., 2010). This research, however, has focused mostly on primary-age students and has failed to show how interactional scaffolds can address text complexity (Brownfield and Wilkinson, 2018; Reynolds, 2017). Case studies of specific secondary teachers who are outstanding interactional scaffolders are present in the literature (e.g. Athanases and de Oliveira, 2014; Ford-Connors and Robertson, 2017; Johnson, 2019; Lee, 1995), but research has not examined interactional scaffolding for adolescents' comprehension across multiple teachers. This gap suggests that secondary teachers are particularly underserved in learning how to navigate the range of possible interactions that arise as their students grapple with complex texts.

To address this need, this article presents examples from an intervention in which students read complex texts with tutors trained in scaffolding aligned with dimensions of text complexity. The intervention caused significant growth in Year 12 students' comprehension for those randomly assigned to it when compared to those randomly assigned to a business-as-usual control group (Reynolds, 2021 for the quantitative results of the controlled experiment). To go beyond those numbers, this article analyses transcripts from the moments where tutors and students confronted the texts' complexity, highlights missed opportunities and shows how teachers can navigate multiple routes towards comprehension.

Theoretical frame: scaffolding the interaction between text, reader and activity

We view reading comprehension as the intersection of reader, text and task, all framed within the socio-cultural context of the reading activity (RAND Reading Study Group, 2002). Readers bring diverse sets of background knowledge, linguistic skills and academic language histories to their reading encounters. In this view, a scaffolder must modulate that encounter to sustain the reader's engagement with the text and support their emerging comprehension. This can be done by designing the activity structure (i.e. the *planned* scaffolding) but also responding to readers' emerging needs during that activity (i.e. the *interactional* scaffolding).

We specifically focus on interactional scaffolding. De Oliveira and Athanases (2017) presented a framework for interactional scaffolding, noting that "interactional scaffolds include oral discourse to prompt elaboration, build academic literacy, and move discourse forward" (p. 127). Scaffolding researchers have also identified *contingency*, or the degree to which the scaffolder's choice of support is aligned with the scaffoldee's initial attempts, as a key feature of scaffolding (Rodgers et al., 2016; Van de Pol et al., 2010). This means that, in instructional practice, contingent scaffolders must be able to assess their students' emerging ideas and select from multiple potential scaffolds. It also means that *transfer of responsibility* (Van de Pol et al., 2010) must be in place: the scaffolder must consistently place the responsibility for the learning on the students and not reserve it for the instructor. These characteristics of scaffolding exemplify a highly interactive and collaborative instructional model.

We also note that Smagorinsky (2018) cautioned literacy teachers against reductive versions of scaffolding that focus only on short-term improvement or versions that ignore important social contexts for adolescent development. We agree. We also believe, though, that studies of interactional scaffolding should see scaffolding as fully social and primarily focused on the trajectories of interaction between teachers and students. Saturating the students' environment with challenging, complex texts and offering contingent scaffolding from scaffolders who build relationships with students could be a successful instructional model.

How can scaffolding address text complexity?

Because existing research has not examined how scaffolding could be aligned with the complexities of texts, we drew on four bodies of research to develop our framework: academic language, conceptual content, motivation and extending talk.

Academic language

Researchers have noted the importance of academic language as students read complex texts (Fang, 2016; Snow, 2010). To develop a set of scaffolds, we relied on the Core Academic Language Skills construct, defined as a "constellation of the high-utility language skills that correspond to linguistic features that are prevalent in academic discourse across school content areas and infrequent in colloquial conversations" (Uccelli et al., 2015, p. 338). This construct has been shown to uniquely predict reading comprehension for adolescents beyond vocabulary and word reading for both English learners and English-only students (Phillips Galloway and Uccelli, 2019; Uccelli et al., 2015). Because complex texts are rich in academic language, aligning our scaffolding framework the six CALS constructs would theoretically provide scaffolders with tools to support students' emerging comprehension.

The six features of the CALS framework served as foundations for our scaffolding design: unpacking complex words, unpacking complex sentences, recognising the academic register, organising analytic texts, connecting ideas logically and tracking participants and themes. We then designed scaffolds around each of the six. In the quantitative study of this intervention (Reynolds, 2021), scaffolds that asked about organising analytic texts and scaffolds that assisted students in unpacking complex sentences were both positively associated with reading comprehension.

Conceptual content and background knowledge

Knowing the importance of background knowledge to comprehension (Hattan and Lupo, 2020; Recht and Leslie, 1988), we added background knowledge scaffolds where tutors could provide factual knowledge. These scaffolds also helped tutors manage students' frustration, as they sometimes grappled with topics they knew little about (Wood et al., 1976).

Beyond background knowledge, research has shown that text complexity is related to the complexity of conceptual content (Goldman and Lee, 2014). So we

designed mediator scaffolds, which allowed tutors to use gestures, drawings, maps or pictures to explain a particularly complex concept.

Motivation

Motivation is an important part of scaffolding (Belland et al., 2013; Wood et al., 1976). In an earlier intervention with middle school students (Reynolds and Goodwin, 2016), motivation scaffolds positively predicted comprehension growth, so we included scaffolds including general praise, praise for particular thinking moves or refocusing student attention.

Extending talk and pressing for evidence

Research on interactional scaffolding has shown benefits of teachers asking students elaborating on their ideas, providing evidence for their claims or clarifying their perspectives (Applebee et al., 2003; Boyd and Rubin, 2006; Murphy et al., 2018). For example, Michener et al. (2018) showed that teachers' follow-up moves during discussions predicted increase student comprehension, and, similarly, McElhone (2012) called this 'conceptual press' and found negative effects for students whose teachers did not use it. These research findings echo the idea of *contingent* scaffolding: that optimal language and reading development is likely to happen when teachers elicit student thinking and then build on student responses (Reynolds and Daniel, 2018; Van de Pol et al., 2010). Finally, because the US Common Core Reading Anchor Standards 1 and 8 require students to provide evidence for claims and evaluate the evidence supporting authors' claims, we included a scaffold that aligned with this skill.

Current study

While many individual examples of quality scaffolding exist in the literature, no systematic attempts of examining interactional scaffolding show how it works across teachers. Therefore, we asked: when tutors read complex texts with Year 12 students, what are examples of successful and unsuccessful interactional scaffolding? These findings can help educators see examples of scaffolding in practice across teachers and students, and help researchers conceptualise the challenges of scaffolding comprehension when students bring a diverse array of knowledge, language skills and engagement with complex texts.

Methods

Participants: students and tutors

This study took place within a larger intervention involving 154 Year 12 students at a diverse public high school in the south-eastern United States. For this study, we explored a subsection of 15 intervention students in six small groups for whom video data were available because they returned parental video consent forms. Of these students, seven were White, six were Black and two were Latino; two were eligible for lunch subsidies; and one was classified with a learning disability. The students had an average ACT (originally the American College Test, now just ACT) reading score of 20.8 on the study's pre-test, just under the US national average of 21.4 (the national SD of reading scores ranges from 5.5 to 6.0 each year). Overall, these students were a diverse cross-section of typically achieving readers. Student names are pseudonyms.

Tutors were chosen for a diversity of backgrounds and experiences, as school teachers often have a breadth of experiences, and we wanted to investigate what scaffolding looks like with both more and less experienced teachers to increase the ecological validity of our findings. Four tutors were White and two were Black. They came from diverse educational backgrounds: two tutors (including the first author, Dan, as well as Laura) were each experienced English teachers with master's degrees and 7–10 years of teaching experience, one was a master's in education teacher candidate (Brandon), one was an undergraduate pre-service English teacher candidate (Megan) and two were medical researchers completing MD/PhD degrees and interested in tutoring students in reading (Portia and Deneshia). Tutor names are used with permission.

Designing the intervention

Each of the eight 37-minute lessons began with a relationship-building conversation. Then, the tutors introduced a daily 'Big Question' to activate prior knowledge and provide a purpose for reading: answering that Big Question. For example, one 'Big Question' was "How does the author deal with her transnational cultural identities?" The bulk of the lessons consisted of scaffolded paraphrasing of complex texts, where one student would read a sentence (sometimes two or three) and another student would paraphrase it, with tutors scaffolding when needed. Paraphrasing was chosen as the focal activity because it has been shown to improve comprehension (e.g. Katims and Harris, 1997) but also surfaces students'

emerging comprehension to serve as the raw material for contingent scaffolding as part of robust classroom discussion (e.g. Murphy et al., 2018). Thus, the students' paraphrases required students to both develop and articulate their emerging comprehension but also serve an in-the-moment assessment to inform the tutors' scaffolding. Figure 1 shows an example of how the participation structure built tutor scaffolding on top of student's paraphrases. Each lesson closed with a summative discussion about the big question. Thus, the lesson plan and paraphrasing participation structure was consistent across lessons.

For the complex texts, we sought out eight short, self-contained authentic passages across disciplines to see how scaffolding worked with a diverse diet of complex concepts and language. Therefore, we selected passages of 700–800 words excerpted from works such as *New York Times* articles, published novels and works from well-known authors such as Stephen Jay Gould, Oliver Sacks and Bharati Mukherjee. We also selected these because they had been used on previous ACT exams and were aligned with the ACT's text complexity framework (ACT Inc., 2006). Though the instruction used these texts, no test preparation was provided. The planned scaffolding instruction focused entirely on comprehending these complex authentic texts.

To facilitate the tutors' interactional scaffolding, we developed a list of scaffolds in Table 1 based on the theoretical framework. This included six groups of CALS-based academic language scaffolds and a group of scaffolds for each of four constructs: motivation, explaining concepts, extending student talk and background knowledge.

Training the tutors

Before teaching, each tutor completed three 2-hour training sessions. The first day focused on the core instructional activity: contingently responding to students' paraphrases. First, tutors received a brief overview of the theory, terms and goals of the intervention, with a focus on contingency. Then, they were given a sample text and the list of scaffolds and asked to identify potential scaffolding opportunities linked to the text's complexity. In discussion, tutors found key transition words, words used in academic registers, structural features of passages and connections across paragraphs – all CALS features. Next, the tutors watched a video of a pilot test of the intervention and discussed whether and how the tutor responded contingently to the students. Finally, tutors practised teaching with partners using intervention texts, discussing the scaffolds they selected and how they
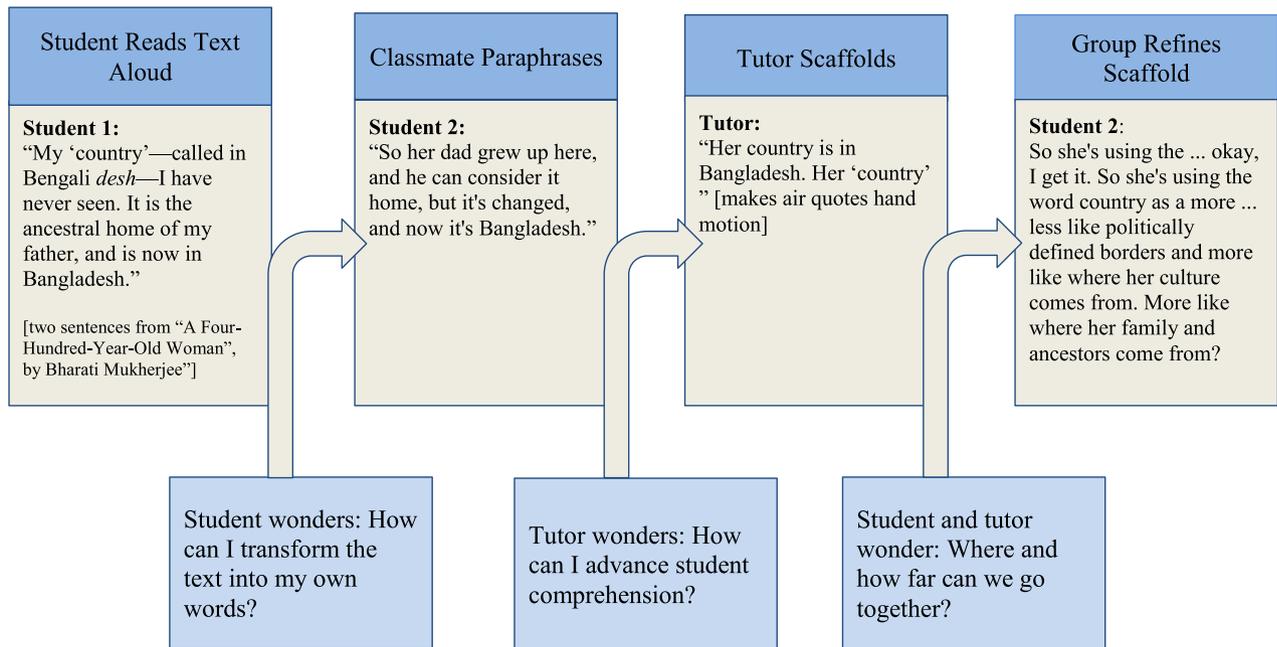
Participation Structure of a Successful Scaffolding Interaction: Text, Paraphrase, Scaffold, Improvement

Student Reads Text Aloud

Student 1:
"My 'country'—called in Bengali *desh*—I have never seen. It is the ancestral home of my father, and is now in Bangladesh."

[two sentences from "A Four-Hundred-Year-Old Woman", by Bharati Mukherjee"]

Classmate Paraphrases

Student 2:
"So her dad grew up here, and he can consider it home, but it's changed, and now it's Bangladesh."

Tutor Scaffolds

Tutor:
"Her country is in Bangladesh. Her 'country' " [makes air quotes hand motion]

Group Refines Scaffold

Student 2:
So she's using the ... okay, I get it. So she's using the word country as a more ... less like politically defined borders and more like where her culture comes from. More like where her family and ancestors come from?

Student wonders: How can I transform the text into my own words?

Tutor wonders: How can I advance student comprehension?

Student and tutor wonder: Where and how far can we go together?

Figure 1: Participation structure of a successful scaffolding interaction: text, paraphrase, scaffold and improvement

strove for contingency. The tutors' homework was to video themselves practising scaffolding using an intervention text. Dan reviewed the videos and provided feedback on the implementation of the planned scaffolding framework and the contingent interactional scaffolding.

Training Day 2 focused on implementing the planned scaffolding framework consistently. The team analysed two homework videos, comparing how they showed contingency. Then, the tutors were introduced to the eight-lesson structure of the intervention and reviewed a sample lesson plan and the complex texts. Then, tutors practised teaching with partners, this time using the lesson plans and practising contingent scaffolding. Their homework was to record a second practice lesson and share the video with Dan to determine if the planned scaffolding framework was being correctly implemented.

On the third day of training, the team discussed the different ways each scaffold could be operationalised, which strengthened the team's shared definitions of the scaffolds. The team used these definitions as they watched and discussed another video of the pilot lesson's scaffolding. Finally, tutors watched a full 37-minute lesson of the pilot intervention so they could see how all the parts worked together to support students comprehending complex texts.

Analysing videos to understand the scaffolding

For this study, we analysed video from Lessons 4 and 5, in which the tutors and students read a selection from the essay *A Four-Hundred-Year-Old Woman* by Bharati Mukherjee (Lesson 4) and Sacks' *An Anthropologist on Mars* (Lesson 5). We chose these lessons for four reasons: (1) because by Lesson 4, the students had gotten used to the paraphrasing and scaffolding instructional routine; (2) because the tutors and students had begun to build relationships and rapport; (3) because we had the most video data for cross-group analysis (technical and scheduling difficulties impeded video collection in later lessons); and (4) because these lessons represented opportunities for scaffolding across both humanities (Mukherjee) and STEM (Sacks) texts.

We chose our coding unit of analysis as a *scaffolding interaction*, which we defined as a series of utterances beginning with the student's initial paraphrase of a chunk of text (usually one sentence and sometimes two or three), the tutor's contingently selected interactional scaffold, and the students' second attempt at a paraphrase, and any further utterances about that chunk of text (see Figure 1 for an example).

We then coded to see whether scaffolding interactions were successful. We defined success as when a group's second (or any subsequent) paraphrase

Table 1: List of scaffolds

Category	#	Scaffold
Extending talk and pressing for evidence	1	Ask student for more or to extend their thinking.
	2	Ask: "Where is the evidence for that?"
	3	Ask: Can you incorporate (textual detail) to your paraphrase?
	4	Ask another student to comment on the first student's thinking
	5	Reformulate a student's paraphrase
Background knowledge	6	Ask student to activate prior knowledge. "What do you already know about …"
	7	Provide definition of vocabulary word
	8	Tell students your interpretation of a sentence/paragraph/whole passage
Morphology/unpacking complex words	9	What do the parts of this word tell you? (highlight morphemes)
	10	Point/box/mark the morphemes/root (or ask a student to do so)
Academic register	11	Point out key punctuation (italics for emphasis and quotation marks for tone)
	12	Ask student to notice register (e.g. What does this regular word mean in this context?)
	13	Highlight metaphorical/symbolic language (e.g. ask "Is X literally happening here?")
	14	Ask student to consider words' connotations
Syntax	15	Ask students to break sentence down and paraphrase each part
	16	Ask student how different parts of the sentence work together
	17	Ask student to note transition words (e.g. *nevertheless*) that indicate syntactic relationships
Connections	18	Ask students how a sentence fits in with earlier sentences/paragraphs
	19	Ask students how characters or ideas have changed since earlier in the text
Tracking participants	20	Point to a verb and ask students "Who/what did this?"
	21	Point to pronoun/nominalisation and ask "What does this refer to?"
Organising analytic texts	22	Ask students "What is the structure of this text?"
	23	Ask students how a sentence/paragraph fits in the structure
	24	Ask students "What did that detail do? Why did the author include it?"
Motivation	25	Express confidence in students' abilities and independence
	26	Connect text to students' lives or ask them to do so
	27	Use humour to note text features and create positive atmosphere
Mediators	28	Act text out or use gestures to demonstrate concepts
	29	Draw/sketch a character, concept or idea
	30	Map out a setting, concept or idea (e.g. concept map)
	31	Show pictures/video/external media to explain idea
	32	Invent an analogy to explain idea (X is like Y)

included more of the features of the text than the initial attempt. They did not necessarily need to be *longer* paraphrases but had to draw more directly on the textual information. For example, in Figure 1, Student 2's initial paraphrase demonstrates an emerging understanding of Mukherjee's sentence, but after the tutor's scaffold, her final version captured more of the texture of the text – particularly demonstrating her understanding of Muhkerjee's use of 'country' as simultaneously literal and metaphorical. Unsuccessful scaffolds were when the group did not improve their original paraphrase. The step of our analysis was

Whitney, who was not involved in the data collection or instruction, coding transcripts and video and coming to an initial coding decision of successful or unsuccessful. Then, Dan reviewed the codes, and we resolved our disagreements by discussion. Consensus was achieved on all codes. After coding, we sorted the scaffolding interactions, looking to see how, with the same text and within the same lesson plan, tutors might have achieved similar patterns of success or failure. To validate our approach, we first performed this analysis on Lesson 4 and then confirmed it with analysis of Lesson 5.

Findings

Finding 1: missed opportunities

Across groups and texts, we found clear patterns in missed opportunities for scaffolding: ignoring deceptively simple sentences and failing to integrate vocabulary scaffolds into the larger texts.

Ignoring deceptively simple sentences. In these examples, tutors failed to notice the potential meanings of simple sentences. For one example, partway through her essay, Mukherjee declares, "I am an American". After every student in all six groups easily paraphrased this simple sentence, none of the six tutors scaffolded. In fact, because Mukherjee was born to a Bangladeshi family in India and emigrated to the United States, her claim is meaningful – and it represents the progression of her cultural identities and notably refutes a hybrid Indian American identity. None of the 15 students or the six tutors, however, picked up on that significance. We speculate that perhaps the tutors and students may have been so focused on academic language – after all, six of our 10 scaffold categories were CALS focused – that they missed the conceptual depth of the deceptively simple sentence.

Taking sentence parts and vocabulary words out of context. Tutors often had to 'zoom in' on particular parts of long, complex sentences to build local understandings, but we found a pattern where those tutors failed to recontextualise those local understandings. For example, in Lesson 5, Megan's group faced the challenge of Sacks' sentence featuring both conceptual and linguistic complexity:

> *[German physicist Hermann von] Helmholtz was very conscious of "color constancy" – the way in which the colors of objects are preserved, so that we can categorize them and always know what we are looking at, despite great fluctuations in the wavelength of the light illuminating them.*

The students expressed immediate concern about unfamiliar vocabulary like 'preserved', 'fluctuations' and 'illuminations'. The scaffolding interaction unfolded over 20 utterances, and Megan carefully and patiently helped the students define each of those three words. In the end, though, after a student defined 'illuminations', Megan said, "Okay, perfect. We'll keep going. It's kind of tricky because none of us are experts on color theory, but just kind of go with it.", and the group never managed to improve their initial paraphrase or come to an understanding of the complex phenomenon of colour constancy. Megan was not alone: at times, tutors lamented their own lack of background knowledge while reading the conceptually complex text, and these certainly represented missed opportunities for scaffolding. Alternatively, Megan could have followed up her scaffold by asking the students to consider the vocabulary words' meaning in the context of the whole sentence (Scaffold #16) or consider Sacks' purpose in mentioning this detail (Scaffold #2).

This example also illustrates a larger trend of missed opportunity scaffolds. Often, tutors noted that student paraphrases avoided complex vocabulary or syntax, and they skilfully and contingently targeted the avoided parts for scaffolding. But often tutors, after unpacking those words or phrases, failed to ask students to integrate those parts into the meaning of the whole sentence or passage. These missed opportunities may have limited students' ability to see the coherence of the whole texts and thus hindered their comprehension.

Finding 2: diverse routes to scaffolding success

We also found a pattern of scaffolding interactions where multiple tutors successfully used completely different routes to scaffold improved understanding. For example, Mukherjee's text describes being caught between Indian and Western culture during her childhood with an apt metaphor: "All my girlhood, I straddled the seesaw of contradictions." Carrie initially paraphrased:

1. Carrie: So, she's talking about all of my younger years growing up. I struggled with I guess, wanting to leave and wanting to stay, because there was a lot of signs saying that you would go … (trailing off …) yeah.
2. Brandon: What do you think, John?
3. John: Basically, she's saying that she does not know what to think anymore because she's conflicted between what her ancestry is saying, which is "stay in India, it's amazing" and what the nuns are saying, which is, who are educating her, which is "you're not going to be successful if you stay in India".

While Carrie's paraphrase starts off strong and trails off, Brandon's simple scaffold (#4) of asking John to pick up where she left off produced a much richer final version and demonstrates successful scaffolding.

On the other hand, in another group, tutor Deneshia sensed her students struggling on this sentence and supported them by focusing on the metaphor of the seesaw (Scaffold #13):

4. Patrick: Well, she straddled … and the seesaw is going back and forth.
5. Deneshia: Right. Very good. That's exactly what it is. So it's not like a literal seesaw, but it's going back and forth.

6. Karen: Yeah.

7. Deneshia: And that's why they say seesaw of contradictions. So what was she going back and forth between?

8. Patrick: Whether she should go or not? You think?

9. Deneshia: Yeah.

10. Karen: Yeah, and staying with her culture.

In Lines 8 and 10, Patrick and Karen collaborate on a better understanding than Patrick's initial attempt in Line 4. These examples show that both Brandon and Deneshia started in very different places but were ultimately successful in advancing their students' comprehension. Particularly noteworthy is Deneshia's contingent use of Scaffold #15 – this is an example of how academic language scaffolding helped Deneshia advance her students' comprehension.

For a final example of diverse routes to scaffolding success, we return to the sentence at the start of this article. Three tutors successfully scaffolded three groups in three different ways. As noted in the introduction, 'Allison', in Laura's group, paraphrased:

11. Allison: So when it came to mixing colors and primary colors, he created the color top which mixed them all and then created a variation of gray.

After a brief discussion, Laura demonstrated spinning a colour top on the table (Scaffold #28) and briefly sang 'dreidel, dreidel' (i.e. the traditional Jewish song sung to celebrate Hanukkah; Scaffold #32) to explain the physical actions of Maxwell's experiment and link it to a concept the students might have understood. Then, Allison picked up her thinking:

12. Allison: Oh, I see … so then did he try to imitate that with three axis and a color triangle to explain how it was created? So he actually had the primary colors and he spun in and it created gray. And then he took three axes in a color triangle and showed how any color could be created by different variations of the … I don't know. I'm confusing myself.

In Line 12, Allison has far improved her initial paraphrase in Line 11 by connecting the colour top and the colour triangle. But even though she made great strides, she still felt confused. Laura, however, listened to Allison's confusion and scaffolding by asking "Let's go back … what was [Maxwell] interested in? The main focus of his scientific study?". Here, Laura decided to help Allison by contextualising the metaphor of the top – thus avoiding one of the pitfalls in the missed opportunity section above. After this scaffold, Allison was ultimately confident in explaining that "Different colors can be created from the different variations". Her confidence in asserting the purpose of Maxwell's study, built with Laura's scaffolding and atop her initial paraphrase, shows that she connected the physical dimensions of Maxwell's scientific methods (the top, the triangle), with his larger purpose

in advancing the science of colour theory. It was a long route to success but ultimately a successful one.

On the other hand, Dan had a different scaffolding task even for the same Sacks sentence. His student, 'Tyler', went beyond the text in his initial paraphrase:

13. Tyler: It's like he was the person who put forth the idea of the color wheel, and the mixture of colors to create new, better, prettier colors.

14. Dan: Better colors? Prettier colors? … Where does it say in the text that he's making better colors?

15. Tyler: It does not say he's making better colors, that was just the first thing that came to mind.

In Line 13, Tyler's extratextual comments contrast with Allison's comments in Lines 11 and 12, where she adheres closely to Sacks' text. In Line 14, Dan's press for evidence (Scaffold #2) kept Tyler grounded in the text in Line 15 and prevented further misconceptions about the text. While this scaffolding interaction unfolded differently from Laura's group, it nevertheless pushed Tyler to articulate his thinking process, improved the accuracy of his paraphrase and likely facilitated his success with the rest of the complex passage.

Finally, Brandon showed that another diverse route to success could be to simply give students space to formulate their thoughts. After reading the sentence, his student Carrie simply paraphrased:

16. Carrie: He's smart.

17. Brandon: Well, yeah. Little bit, little bit here.

18. Carrie: So it's just saying how he, I guess, just created the, in a way, color combinations ….

19. Brandon: Okay.

20. Carrie: That use the color theory, so it was primary colors, red, yellow, and blue.

21. Brandon: Mm-hmm (affirmative).

22. Carrie: To create other mixtures of colors just by using three colors. So I guess there's a big discovery of that.

Brandon's scaffolding is quite hands-off. He simply allows Carrie the space to work out her paraphrase (Scaffold #1). In Line 17, he opens the door to her first real attempt at paraphrasing and maintains the *transfer of responsibility* (Van de Pol et al., 2010) by giving her space and also expecting her to keep thinking. Her responses in Lines 20 and 22 show a clearly improved paraphrase. Ultimately, Brandon's patience pays off.

Faced with very different initial paraphrases in Lines 11, 14 and 16, Laura, Dan and Brandon nevertheless guided their groups to improved comprehension. Laura provided specific conceptual support and integrated that support into the context of the passage, Dan pressed for textual evidence and Brandon simply gave his student space to think. These examples show the power of how educators, equipped with a strong

scaffolding toolkit and familiar with the challenges of complex texts, can meet all students where they are and scaffold them towards greater understandings.

Implications

Finding 2 shows the ideal vision of interactional scaffolding pedagogy: tutors contingently responding to diverse student thinking and moving each group forward in its own way. Much of this success could be replicated in large-group classroom instruction based on the following principles:

- challenging students with complex texts rich in academic concepts and language;
- developing a classroom culture that prizes interaction, collaboration and feedback;
- learning about theories of academic language and how they are operationalised; and
- uncovering emerging comprehension and responding contingently.

These principles were the foundation for the positive quantitative outcomes of the intervention (Reynolds, 2021), and we saw in these transcripts that students were, at times, well supported in encountering complex texts.

Finding 1, though, strikes a cautionary note. Simply knowing a list of scaffolds and selecting a complex text are not enough. We remind teachers to look for scaffolding opportunities in even the simple sentences of a complex text. In skipping over these simple sentences, the scaffolders may have missed the chance to engage students in the conceptual dimension of text complexity. In the example above, what does it truly mean for Mukherjee, of Bangladeshi heritage and educated by Irish nuns, to declare herself fully American? How do students, with their own layered and complex identities, wrestle with the complexity of an author's claims about her identity? At times the sentences richer in academic language (cf. the seesaw example above) provoked such discussion, but the focus on academic language scaffolding may have limited opportunities for deeper discussion about complex topics such as multilayered immigrant identities or the neurological construction of human colour vision. In fact, simpler sentences may be helpful gateways for students to reflect on the main concepts of a passage without the added challenge of academic language.

Similarly, we saw examples where tutors and students alike were blinded by the academic language and vocabulary of the passage (cf. Megan's group). An over-focus on vocabulary words or academic language can blind teachers to the larger purposes of the passages and the larger complexity of texts. We remind teachers that, when they 'zoom in' on a specific vocabulary word or unpack a particularly complex piece of syntax, they must always 'zoom out' and ask students about the detail's place in the text. This may be because tutors were often challenged by the conceptual complexity of the texts – Sacks' passage caused several tutors to acknowledge their own incomplete understandings. Tutors might have felt more comfortable 'zooming in' because they were confident in their own understanding of individual vocabulary words, but might not have 'zoomed out' if they were less confident in understanding how those words convey the precise complexity of Sacks' claim about the neurologically constructed nature of human colour vision. It seems, then, that teachers' conceptual knowledge is likely also a foundation for effective interactional scaffolding.

Beyond building their own knowledge of the concepts in complex text, teachers might consider using the scaffold list in Table 1 to refine their practice. As these transcripts show, different groups needed different kinds of support, and no scaffold or group of scaffolds is sufficient. Our findings show that even simple scaffolds such as giving students space to think or pressing them for evidence could be successful. At other times, scaffolds addressing the texts' academic language, such as noting metaphorical language or asking how details fit into the text's structure, are crucial building blocks of comprehension. Teachers should apply these scaffolds contingently: they are not a recipe for comprehension but rather a menu of choices to meet variations in students' emerging thinking and push it forward. Over time, especially if used with similar texts and with similar activity frames, teachers can grow in their understanding of how the scaffolds interact with the complexities of texts as well as the complex knowledge and linguistic variations in their students.

Teachers using Table 1 might also consider combining them. For example, Megan's decision to scaffold by defining key vocabulary words in the text was certainly contingent on her students' responses: they admitted they did not know the words' meanings. But even three definitions were insufficient to help them understand the sentence. On the other hand, after scaffolding the specific conceptual content of the sentence, Laura made sure to recontextualise the work within Sacks' passage, and her students integrated the parts of the complex sentence into a more coherent whole. Careful combinations of the scaffolds and contextualising the scaffolds within the whole passage's purpose might help the tutors address the knowledge and the linguistic challenges of complex texts.

These combinations are ultimately more than brief interactions – they are part of broader curriculum design that sees complex texts as not end goals in

themselves but as the foundation of linguistically and conceptually complex conversations among students and teachers (Phillips Galloway et al., 2020). To lay the groundwork for these conversations, teachers might also consider how they can design participation structures (cf. Figure 1) that bring students into direct textual encounters (as we did with paraphrasing) and also produce talk that can be extended via high-quality discussion protocols. In this regard, the focus is not on the complexity of the texts but the complexity of academic conversations and students' awareness of academic language registers (Phillips Galloway et al., 2020; Uccelli and Phillips Galloway, 2017). If students can make explicit their ideas and also name their moments of confusion, teachers and students can work together to assemble coherent interpretations out of complex ideas and language. For example, following Uccelli et al.'s (2020) examples, teachers of linguistically diverse students can explicitly draw on a CALS-informed discussion of academic registers within content-rich units of instruction. Connecting these larger conversations with this study's micro-interactions might help literacy educators develop frameworks for even more robust discussions.

Limitations

While the study was unique in examining the interactional scaffolding across multiple groups within the same planned scaffolding frame, we still only examined the work of six tutors and 15 students. Future studies might consider how these scaffolds translate to larger classroom groups and more students (Smit et al., 2017).

In addition, due to the cross-sectional design of this study and the relative brevity of the eight-lesson intervention, we could not examine how trajectories of interactional scaffolding build over time. No doubt these interactions are microcosms of the larger patterns of scaffolding over eight lessons, which would themselves be mere snippets of the many interactions students have with teachers about texts during their time in secondary schools. Future research might trace the evolution of comprehension scaffolding and contingency over time.

Finally, our focus on interactional scaffolding required a local measure of scaffolding success in each scaffolding interaction. But we wonder: how do these small successes and failures relate to larger outcomes? How do students learn to transfer scaffolded thinking to new texts and tasks? These questions might inspire scaffolding researchers to probe the links between these interactions and larger learning scales and trajectories. Again, examples from existing CALS-informed

classroom research (Phillips Galloway et al., 2020; Uccelli et al., 2020) might exemplify this work for both teachers and researchers interested in scaling CALS-informed instruction into larger curriculum sequences than the micro-interactions presented here.

Conclusions

Ultimately, meeting students exactly where they are as they interact with complex texts – and guiding them forward – is no easy feat. Still, we hope this article energises teachers to scaffold students toward deeper encounters with and understanding of complex texts and inspires researchers to investigate the moments where teachers, students and complex texts meet.

Conflict of interest

None.

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