Fostering critical reasoning: Developing argumentative competence in early and middle primary years

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ABSTRACT

The capacity to reason critically and negotiate ideas and differences lies at the heart of quality education. Through critical reasoning we construct, organise, and justify knowledge; and we create new ideas and practices. Despite the emphasis on teaching argumentative writing in school curricula, existing research consistently shows that arguing well presents significant challenges to students of all ages and backgrounds. This paper argues that addressing this issue requires a novel understanding of argumentation not being so much a written form but a form of critical reasoning—the ability to reason, critique justify and evidence. Using classroom video recordings of two primary literacy classes and interviews with the teacher, and drawing on the pedagogic register analysis, the paper identifies pedagogic practices that support the development of students' abilities to take a stance, inquire about attitude, and reason with evidence. The findings have important implications for the design of effective pedagogic practices to expand students' potential to reason and critique across primary years of schooling.

Introduction

The capacity to reason critically and argue lies at the heart of quality education for productive participation in rapidly changing knowledge societies where new ideas are constantly generated. Through reasoned argumentation we construct, organise, and justify knowledge; and we create new ideas and practices. At a time of constant political and social challenges, Thomas and Brown (2011) argue that the future of a society depends on cultivating citizens who can effectively evaluate and negotiate ideas and differences. Developing argumentative competence—the ability to engage in reasoned negotiation of issues, questions and perspectives—is a key way in which schools can prepare students to become informed and engaged knowledge consumers and creators of the 21st century (Goldman et al., 2016; Goldman & Scardamalia, 2013).

Despite the centrality of argumentation to learning and civic life, it has been consistently shown that, even after many years of conventional instruction, few students have mastered the complex skills of constructing logical, coherent, and convincing arguments required for academic success in schools and universities (Newell et al., 2011). National and international assessment data likewise demonstrate a lack of growth in students' ability to understand, generate, and evaluate arguments. The 2017 Performance for International Student Assessment (PISA) results, for example, show that only 28% of students across Organisation of Economic Co-operation and Development (OECD) countries were able to make critical judgements on complex issues in collaborative problem-solving tasks (OECD, 2017). In Australia, analysis of National Assessment Program—Literacy and Numeracy (NAPLAN) results in persuasive writing over time shows a decreasing capacity to meet national benchmarks beyond the late primary years (ACARA, 2018). This 'writing skills slump'—the lack of sustained growth in advanced literacy skills—needs to be redressed if school students are to become engaged and agentive citizens (Chen et al., forthcoming).

Yet policy recommendations constantly point to basic, introductory literacy skills as a remedial measure for lifting performance in argumentative writing (Chen

et al., 2020). Addressing the issue of the decline in writing outcomes requires a novel understanding of argumentation not being so much a written product but a form of critical reasoning—the ability to infer, critique, justify and evidence (Iordanou et al., 2016; McNaughton, 2020). This requires complex processing of abstraction, which has often been regarded as constituting a source of difficulties for school students, particularly young children (Christie & Derewianka, 2008).

In this paper we investigate pedagogical practices through which critical reasoning may be fostered as an integral part of learning to argue in early and middle years of primary schooling. Drawing on classroom observation data collected as part of a larger longitudinal project, our analysis examines pedagogic practices that are employed to apprentice young children into the discourse of argumentation in two primary classrooms: one Kindergarten and one Year 3/4 classroom.

Developing argumentative competence through guided collaborative reasoning

This paper draws on an integrated conception of argumentative competence as a linguistic, cognitive and social construct, bringing together multiple perspectives on the matter of learning to argue. From a linguistic perspective, learning to argue entails textual competence—the ability to understand and apply nuanced language structures to produce well-formulated arguments (e.g., Christie & Derewianka, 2008; Martin & Rose, 2008). The cognitive perspective highlights the implicit process of arriving at reasoned argumentation (Crowell & Kuhn, 2014; Iordanou et al., 2016; Mercier, 2011): it involves appropriating critical reasoning, consciously formulating and challenging a position with reasons and evidence. The social perspective attends to the quality of the situated context whereby processes of explaining, justifying and reasoning are understood and mediated through collaborative reasoning or reasoned discussion with others (Anderson et al., 2001; Clark et al., 2003; Reznitskaya et al., 2009).

Integrating these approaches produces a dynamic relationship between enacted performance in writing, the capacity to reason critically, and the power of collaborative talk. This conceptualisation takes account of how children learn best and is grounded in the sociocultural theory of learning which posits that language development originates in social interaction (Mercer, 2013; Vygotsky, 1978). In this study, collaborative reasoning provides an important site for young children to understand and appropriate processes of articulating, justifying and challenging positions while resolving controversial issues (Anderson et al., 2001; Clark et al., 2003). The central premise is that collective reasoning co-constructed in group discussions can later be transformed into internalised argumentation to guide writing (Anderson et al., 2001; Mercer, 2013).

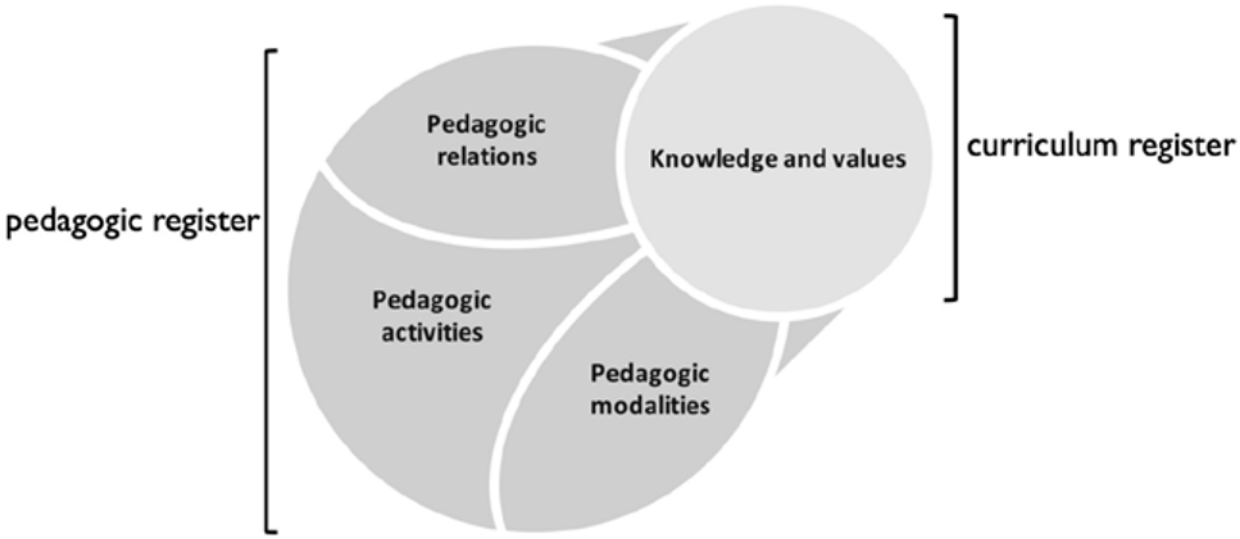
This paper further argues that such transfer cannot take place without appropriate support and scaffolding. As Halliday (1994) contends, "by attending to text-in-situation a child construes the code, and by using the code to interpret text she/he construes the culture" (p. xxxi). In this view of learning, students make sense of argumentation practices enacted in the collaborative reasoned discussions. A critical condition thus depends upon teacher-guided collaborative reasoning that brings "intuitive knowledge to consciousness" (Rose, 2019, p. 247). This provision is particularly important for those less advantaged students who do not have "the means to access those abstract meanings" (Jones et al., forthcoming). However, current research adopting a collaborative reasoning approach has limited its pedagogic potential to peer-led reasoned discussions (e.g. Anderson et al., 2001; Clark et al., 2003; Reznitskaya et al., 2009), claiming that the teacher-fronted Initiation-Response-Feedback (IRF) exchange structure is not conducive to dialogic exchanges of positions, reasons and evidence. Recent studies have shown that acts of argumentation such as agreeing and disagreeing can be promoted through whole-class dialogic discussions (Davidson & Edwards-Groves, 2018; Edwards-Groves & Davidson, 2017).

This paper examines examples of teacher-guided collaborative reasoning in two primary classrooms. Drawing on the Systemic Functional Linguistics (SFL) theory of pedagogic register, we provide a detailed linguistic analysis of guided collaborative reasoning in assisting young children to attend to critical reasoning. The analysis provides insights into how young children are enculturated into "ways of behaving, of knowing and of thinking" (Christie, 2002, p. 162) in Kindergarten and how this reasoning approach shifts to support literacy transitions in a higher grade (Year 3/4).

Analysing pedagogic practice

The pedagogic register analysis framework (Rose, 2014, 2018, 2019) employed in this paper draws on the notion of *curriculum genres* as a way of characterising patterns of pedagogic discourse (Christie, 1995). *Curriculum genres*—as the collaborative reasoning discussions are viewed—consist of configurations of two registers: the *curriculum register*, being the knowledge and values to be accumulated by the students, and the *pedagogic register,* being the activity, relations and modalities through which the knowledge and values are acquired.

Figure 1. Dimensions of a Curriculum Genre (Rose, 2018, p. 2)



Diagrammed in Figure 1, knowledge and values are exchanged through *pedagogic activities*, mediated by the *pedagogic relations* between those involved and facilitated by *pedagogic modalities*, whether spoken, written or visual. This multidimensional framework extends beyond the simpler account of argumentation moves within reasoned discussions (Anderson et al., 2001; Clark et al., 2003; Reznitskaya et al., 2009) to offer a nuanced means to analyse practices and affordances of guided collaborative reasoning.

Structurally speaking, *pedagogic activities* unfold in phases of learning *cycles,* which are realised as exchanges between teachers and students. These cycles centre on the learning *task* through which knowledge is construed or acquired by the student (Rose, 2014, 2018). The teacher typically *prepares* and specifies the *focus* of the task, then, once the *task* is attempted or completed by a student, *evaluates* and perhaps *elaborates* on the knowledge construed in the Task. The teacher's role in an exchange is that of *primary knower* (K1) or *primary knower delaying knowledge* (dK1) (typically by posing a question). Students are *secondary knowers* (K2), seeking and acquiring knowledge. The learner's task (the K2 response) may be to *identify* an element in a text, or to *propose* an element from knowledge, or to *receive* information. Occasionally, the exchange roles are those of *actors* (A1/A2) in an action exchange.

Rose (2018) formulates a social model of consciousness as "unfolding *pedagogic relations*" (p. 30), where any small or large exchange between teachers and students enacts a distinct set of conscious or behavioural acts. As such, learner participation may be orchestrated through conscious acts involving perceptive acts of *attention*, *perception*, and *knowledge*, cognitive acts of *choice* and *reasoning* and affective acts of *engagement* and *anticipation*. Alternatively, students may be engaged in behavioural acts involving *display* and *accordance* with the teacher. We are interested in repertoires of participation that contribute to reasoned discussions.

Analysis of *pedagogic modalities* captures the resources for accessing meaning. Sources of meaning may be derived from persons (i.e., teacher and learner knowledge), activities, the environment, and recorded images and texts, typically through sourcing methods of speaking and gesturing, but often through writing, drawing, highlighting or online forms or in gestural or physical forms. In this paper, analysis of sources of knowledge shed additional light on the types of evidence employed by children to support their positions, whether they are sourced from their intuitive or reflective inferences (Mercier, 2011).

The data

The data informing this paper include classroom observations and interview extracts drawn from a larger longitudinal study *Transforming Literacy Outcomes* (Jones et al., 2014-2018) investigating students' literacy experiences of change at key transition points from preschool to high school in New South Wales, Australia. The overall project employs qualitative and ethnographic research methods drawing on lesson observations, interviews with teachers, curriculum documents and student writing samples. Across the nine research sites, two consecutive lessons with a literacy focus were video recorded of each of 25 case study classes to provide detailed descriptions of language and literacy

pedagogy at key transition points.

The data reported in this paper are drawn from one site, a multicultural public school located in a low socio-economic setting (2020, myschool.edu.au). The school was an Early Action for Success (EAfS) receiving targeted additional funding to support improved literacy and numeracy outcomes in disadvantaged schools (Chen & Vale, 2020). We examine two videoed writing lessons, each of which had an explicit focus on argumentative reasoning—one in Kindergarten and the second in a composite Year 3/4 class observed 12 months later. Both lessons were chosen as they were taught by Neil[1], an experienced teacher. Observing the same teacher teaching across different grades provides an ideal opportunity to examine pedagogic practices the teacher employs to support literacy transitions. Extracts of interview data were included to supplement the pedagogic register analysis of how this one teacher acculturates students into argumentation practices.

The Kindergarten lesson focuses on a class favourite, *Oh No George*, by Chris Haughton. The book ends with the dog George's actions unresolved, and Neil uses the situation to ask the children to speculate on the next action and choose one of two alternatives. The idea is to think through reasons for taking a position.

The Year 3/4 lesson also revolves around a picture book, *The Whale's Song*, by Dyan Sheldon, illustrated by Gary Blythe, a gentle story where two characters (Lilly's grandma and Uncle Frederick) have different views about whales. The class has been learning to write paragraphs using the writing scaffold TXXXC[2] structure (Topic sentence, Explanation, Extension, Example, Conclusion). For the lesson, Neil has written a model paragraph containing Uncle Frederick's views on whales. Together, teacher and learners de-construct the paragraph, concentrating on the meaning of each step and modality choices appropriate for expressing points of view. The students' task is then to write a paragraph from Grandma's position.

Analysis

Episodes of whole class discussions that had an explicit focus on teaching argumentation were transcribed and analysed. The starting point for our analysis is the global structuring of curriculum genres, to identify the broad lesson phases as captured in Figures 2 and 3. The pedagogic register analyses of the selected exchanges are presented in Tables 2-7. Pedagogic interactions are presented as a separate line for each verbal and non-verbal move. Speaker roles are analysed in terms of who is speaking (**Sp** column) and the specific role of the speaker in the exchange (K1, K2 etc) as indicated in the **Role** column.

Pedagogic interactions are divided into a series of learning *cycles* (**C** column) that are centred on learner tasks (**Phases** column). The pedagogic function of each move is analysed following the orbital structure of a pedagogic interaction proposed by Rose (2014, 2019) and Rose and Martin (2012): Prepare-Focus-**Task**-Evaluate-Elaborate. The Focus is an obligatory move and therefore an indicator of a new learning cycle. Dotted lines are drawn between moves while solid lines are used to mark boundaries between learning cycles. The final two columns of each table identify the **Sourcing** of meanings and the **Interacts**—the repertoires of participation—that are employed to support pedagogic activities. Together the values indicated in each of the columns contribute to understanding the structure, function and effectiveness of pedagogic practices that support the development of argumentative competence.

5.1 Learning to argue in the Kindergarten classroom

The two-minute episode examined here centres around the question "What will George do?" when he is confronted with the thing he loves most—the rubbish bin. George wants to be good but cannot resist the temptation of all the things he loves doing (e.g., eating cakes, chasing cats). Neil prepares the children for the tasks of choosing, explaining their choice and reasoning by revisiting the book and focusing on the last page. Neil's intent is to contextualise *learning to argue* through a familiar experience, in this case through reading again *Oh No George* to consolidate a shared understanding. This intention is supported in a post-observation interview with the teacher:

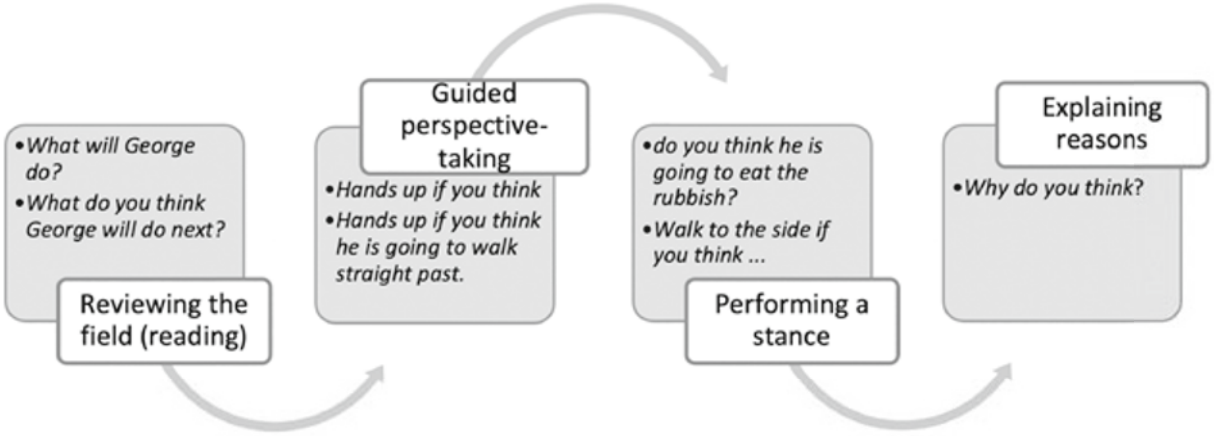
> To do the writing, you need to have a **familiar experience**... And I chose the book because it was one that they've all read, they're all familiar with… it more lends itself to open that discussion of that thing, and during the reading I got to the end and had a discussion with the kids, and part of the discussion question was, it's got a dog, he's done all these naughty things, then he starts being good again, and then he's presented with a situation where there's a rubbish bin and he's gone to dig in the rubbish, and the author leaves it there just hanging—like is he going to dig in the rubbish or not? And so the kids had a discussion and that's what I was planning on writing (Interview with Neil, May 2016).

Figure 2 provides an overview of the global structuring of the two-minute episode. The central tasks centre

1 Name changed to protect anonymity.

2 Neil explained in the interview that the letter 'x' is used in the acronym because of its representation of triple 'exs'—**ex**planation, **ex**tension, and **ex**ample.

Figure 2. The staging structure of the Kindergarten lesson episode



around an inferencing question: "I wonder what will happen next…?" Neil narrows the focus to the character, then to the character's potential action. The pedagogic activities unfold in four distinct phases: reviewing the field (reading the story), guided perspective-taking ("Hands up if you think?"), performing a stance through an action exchange ("Walk to the side if you think") and explaining reasons ("Why do you think?"). Below we focus on the pedagogic practices in the final two exchanges where critical reasoning is fostered.

5.1.1 Performing a stance

Table 1 provides an overview of the *Performing a stance* exchange where students are invited to indicate their stance through performing an action. There are two sets of learning cycles, each made up of both a knowledge and an action exchange. According to Rose (2014, 2018) the pedagogic activity can function as an exchange of knowledge or an action. In this sequence, the teacher deploys two action exchanges to support the learning task of taking a stance. Notably, the two dA1 action exchanges function pedagogically to both instruct (i.e., to make a prediction) and regulate (i.e., to perform an action).

The task focus here is to make an inference and perform a stance. Within each cycle (c), Neil inquires attitude through a K1 question, calling on students to infer "what will happen next". The teacher guides the students to act out their positioning of 'agreeing' or 'disagreeing' by walking to one side or the other: "If you think George is going to eat the rubbish, *come to sit over* this side" (c1); "If you DON'T think George is gonna to eat the rubbish, *go and stand* next to Mr Smith" (c2); "Well, stand over here if you think …" (c3). Students *propose accordance* by taking a side—standing next to the practice teacher Mr Smith or being seated next to Neil. In this short exchange, the learning task of perspective-taking is mediated through an interweaving of pedagogic modalities and pedagogic relations which are appropriate for the Kindergarten class.

Table 1. Performing a stance

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	If you think George is going to eat the rubbish,	K1	focus idea	enquire learner knowledge/prior move	direct display
		come to sit over this side.	dA1			direct behaviour
		Stand up. Come and stand over this side.				insist behaviour
		if you think he is gonna to eat the rubbish.	K1			insist display
	Ss	(Walk to one side)	A1	propose		accordance
2	T	If you DON'T think George is gonna to eat the rubbish,	K1	focus idea	enquire learner knowledge/prior move	direct display
		go and stand next to Mr Smith.	dA1			direct behaviour
	S	(walk to the other side)	A1	propose		accordance

Neil prepares the class for the learning task by reviewing the field (the story) and rehearsing the perspective-taking ("hands up"). The knowledge that is exchanged draws on prior lesson moves as sources of meaning. Learner participation enacted through pedagogic relations is construed by the solicited interacts of *behaviour* and *accordance*. The teacher facilitates the learning task by *directing and insisting* behaviour ("come to sit over this side").

5.1.2 Explaining reasons

In the *Explaining reasons* exchange presented in Table 2, Neil guides the students to explore multiple perspectives on the question, "What will George do?" The focus of the pedagogic activities is twofold: to provide predictions and to explain reasons for their predictions. There are two different hypotheses about what George will do: "George is not going to eat the rubbish" (c1/c3); "George is going to eat the rubbish" (c5/c7). The two hypotheses form two contrasting perspectives.

Table 2. Explaining reasons

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	Ollie, do you think he is going to eat the rubbish?	dK1	focus idea	enquire learner knowledge	invite display
	O	No, but he is gonna to walk straight past.	K2	propose	infer learner knowledge	display choice
2	T	**Why, why do you** think that, Ollie?	dK1	focus reason	enquire learner knowledge	inquire reasoning
	O	Because dogs don't eat rubbish. They smell it.	K2	propose	recall learner knowledge	display reasoning
	T	Oh, I love that word you used just then,	K1	evaluate		praise
		the word '**because**'.		elaborate	restate word	
3	T	**What do you think**, Lachlan? Do you think George is going to eat the rubbish?	dK1	focus idea	enquire learner knowledge	invite display
		La (shaking head)	K2	propose		display choice
4	T	**Why do you think** George is not going to eat the rubbish?	dK1	focus reason	enquire learner knowledge	inquire reasoning
	La	Because he ...	K2	propose	recall	
	T	Because he is?	dK1		restate	insist reasoning
	La	Good	K2	propose	recall prior move	display reasoning
	T	Good Boy. I love that word '**because**'.		evaluate elaborate	restate word	praise reasoning
5	T	Hmm, Tara, **do you think** George is going to eat the rubbish.	dK1	focus idea	enquire learner knowledge/prior move	invite display
	Ta	(nodding).	K2	propose		display choice
	T	Tou do?	K1	evaluate	repeat	check choice
6	T	Why do you think he is going to eat the rubbish?	dK1	focus reason	enquire learner knowledge	inquire reasoning
	Ta	... (bending her head down)	K2			demur display
7	T	How about you Lila? **Do you think** George is going to eat rubbish?	dK1	focus idea	enquire learner knowledge	invite display
	Li	(nodding)	K2	propose		display choice
	T	Yep	K1	focus reason		inquire reason

Table 2. Explaining reasons (continued)

C	Sp	Transcript continued	Role	Phases	Sourcing	Interact
7	Li	Because you … because it says there is nothing more than … George likes, than rubbish.	K2	identify	recall text	display reasoning
	T	I like how you use that word '**because**' as well. Fantastic, well done.	K2	evaluate/ elaborate	restate word	praise reasoning

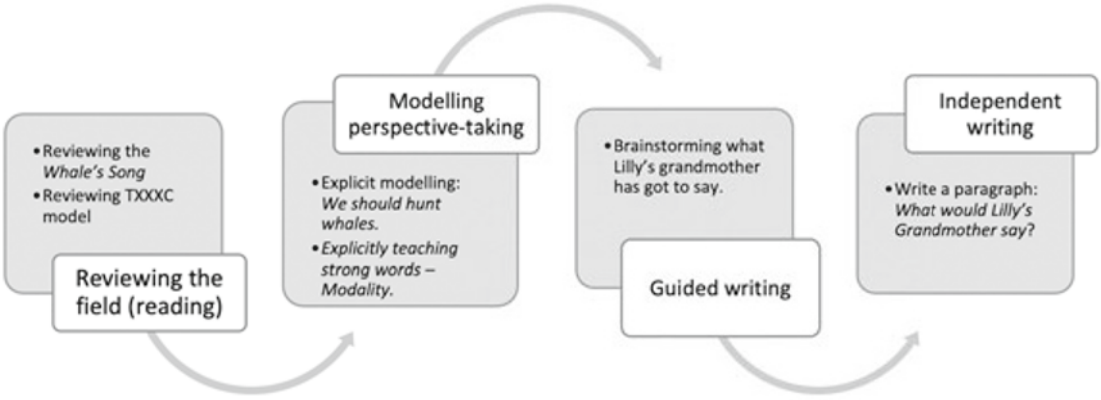
An important step in developing argumentative competence is coming to appreciate the need to support one's claims. Neil invites students on each side to provide reasons to support their claims based on their prior knowledge or the text. In cycles 2 and 4, the teacher *inquires reasoning* to support the hypothesis that "he is gonna to walk straight past". In cycle 2, Ollie offers an intuitive explanation of his hypothesis by referring to his personal knowledge: "Because dogs don't eat rubbish. They smell it" (c2/O). Neil praises the word choice "because" but did not explicitly affirm the answer. In cycle 4, the teacher continues to invite Lachlan to provide *reasoning* for his positioning. On Neil's insistence and prompt, Lachlan responds by *recalling* his knowledge about George: "Because he is … good" (c4/La). Both students refer to their prior knowledge as a source of evidence to support their claims. In cycles 5–7 the teacher presses the students on the other side to provide reasoning to support their position that "George is going to eat the rubbish". In cycle 7, Lila *displays reasoning*, quoting evidence from the text: "because it says there is nothing more than … George likes, than rubbish" (c7/Li). Neil accepts the answer by affirming: "Fantastic. Well done."

Throughout this exchange students are expected to take a stance and have reasons for the stance. Neil communicates the value of a reasoned argument through constantly affirming the word "because" in the evaluation moves as shown below:

"Oh, I love that word you used just then, the word 'because'." (c2/K1)
"I love that word 'because'." (c4/K1)
"I like how you use that word 'because' as well." (c7/K1)

The analysis of pedagogic modalities provides further insights into sources of knowledge drawn on by the children to support their hypotheses, ranging from prior learner knowledge (c2/K2), memory (c4/K2), and shared text (c7/K2). As discussed earlier, Mercier (2011) distinguishes between two types of evidence: intuitive and reflective inferences. The reflective inferences which demonstrate critical reasoning of the evidential relationships is evidenced in Lila's response. This form of textual evidence was valued and affirmed by Neil as a more acceptable way to achieve justifiable arguments.

Figure 3. The staging structure of the Year 3/4 lesson episode



5.2 Fostering emergent practices in argumentation in Year 3/4

The Year 3/4 lesson included here took place 12 months later when Neil was moved to Stage 23. *The Whales' Song* was chosen as the mediating text. The lesson episode (~ 20 minutes) examined here is one in a series that explores information about whales and different points of view expressed by the characters portrayed in the text. As shown in the analysis of the Kindergarten lesson, Neil places much value on points of view and justifiable positions. Fostering guided collaborative

3 In NSW, schooling is organised into seven 'stages' of learning. Kindergarten is Early Stage 1, Years 1 and 2 are Stage 1, Years 3 and 4 are Stage 2 etc.

reasoning seems to be a strategy that Neil employed to develop young children's argumentative competence.

As in the Kindergarten lesson, the Year 3/4 lesson is structured in four main stages (see Figure 3): reviewing the field (reading), modelling perspective-taking, guided writing, and independent writing. Both lessons begin with the reading of a familiar story aimed at preparing the class for the discussions of different points of view. The use of a mediating text was pivotal to Neil's approach to develop the students' ability to represent and reflect on different perspectives. This is indicated in the post-lesson interview with Neil:

> The main focus has been however the central text, and then kind of branching out from that. So my central text is *The Whale's Song* and my concept for this … term has been point of view, … and so *The Whale's Song* gives a really nice point of view on that. Branch out and look at different texts and different, you know, different ways of writing as well as reading as well. So *The Whale's Song* kind of lends itself to that persuasive writing with whales, also lends itself to information reports so—and it's showing the kids that your whole reasons, argument, can be different because of your change of position so that's quite powerful I think to show (Interview with Neil, May 2017).

5.2.1 Modelled perspective-taking

A point of pedagogic difference in the Years 3/4 class is the introduction of specialised knowledge into the pedagogic activity—the use of a TXXXC structure to scaffold the development of arguments. Using a textual scaffold is a common classroom practice. Neil builds students' understanding of the structure of a persuasive argument through a teacher-authored exemplar

Table 3. Modelling through a teacher authored exemplar

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	Now, 'Uncle Frederick' wrote a TXXXC paragraph on whales.	K1	prepare text	remind move	direct perception
		His question was 'We should hunt whales'.		focus idea	new	
		What do you think?			enquire learner knowledge	inquire reasoning
		And he said it was for their blubber.		focus reason	restate prior move	
2		Let's read these sentences.	K1	focus text		
		Whales are very useful animals and should be hunted for the blubber. Whale blubber can be boiled and the oil can be used for lamps, heating and cosmetics. Many countries still use whales products and a small amount of oil can cost a lot of money. The blubber from even a small whale will improve our family finances. I firmly believe that we need to hunt a whale to pay for Lilly's schooling.		receive text	read text	model reasoning
	S					
3	T	*What do you think of that paragraph?*	dK1	focus text	enquire text	inquire
		What do you think, Sam?				perception
	Sa	He wants to hunt the whales so they can pay for Lilly's schooling	K2	identify reason		display reasoning
	T	Good	K1	evaluate		approve reasoning
4	T	*Do you think this is what Uncle Frederick might think?*	dK1	focus idea	enquire prior move	inquire reasoning
	Sa	Yes. He thinks they should hunt whales for useful things like …	K2	identify idea		display reasoning
5	T	What do you think? (points to another student)	dK1	focus text	enquire text	invite reasoning
	S	Maybe he thinks they can pay for her school.	K2	identify reason		display reasoning
	T	It can pay for her school.	K1	evaluate		repeat

paragraph that contextualises the claim-evidence relationship.

Table 3 presents an extract of the modelling stage where the textual scaffold was introduced and explained. The social purpose of the taught argument was to present a point of view from Uncle Frederick's perspective. The pedagogic activity centers around the argument "We should hunt whales" mediated by the students' prior knowledge and discussions of the text. Pedagogic modalities, the sources of meanings, are critical in the pedagogic register analysis. In this Year 3/4 classroom, the mediating text and teachers' writing are deployed to bring meanings into the discourse.

Rose (2018) suggests that critical to the pedagogic activity of modelling are the kind of conscious acts that teachers engage learners in. In the process of modelling, Neil invites the students to reflect on the use of reasoning strategies and through a range of cognitive acts he

Table 4. Modelling through a textual scaffold

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	But let's have a look how I have used TXXXC. (shows breakdown of paragraph)		prepare paragraph	point text	direct perception
		So, firstly my topic sentence—*Whales are very useful animals and should be hunted for their blubber.*			read text	
		That's my **topic sentence**. ***Does it explain*** anything about 'why'?	dK1	focus feature	locate text	inquire knowledge
	S	No	K2	identify feature		display knowledge
	T	No,	K1	evaluate		repeat
		because **a topic sentence** does not do that.		elaborate		impart knowledge
2		… (deals with first X - Explanation) …				
3	T	Can you read the next sentence for me?	dK1	prepare sentence	locate text	invite reception
		Our second X is to ***Extend your information***.		focus feature		model knowledge
	S	*Many countries still use whales products and a small amount of oil can cost a lot of money.*	K2	identify	read text	display
	T	Excellent.	K1	evaluate		praise
		That was, that was **my Extension**. So I ***explained my Extension***.		elaborate feature	point text	model knowledge
4	T	And the hardest part I found is to write, is to ***write the Example***.	K1	prepare feature	compare	impart knowledge
		We need to ***write a good Example***.		focus	remind prior lesson	
		And I chose **my Example** to be a s*mall whale today.*		receive		model choice
		The blubber from even a small whale will improve our family finances.			read text	
5	T	And finally, a **Concluding sentence**—	K1	prepare feature		
		In the Conclusion I am really just saying what I've said before in my topic sentence, but I might ***put my opinion*** in it as well.		focusd	remind prior lesson	impart knowledge
		So I firmly believe that we need to hunt a whale to pay for Lilly's schooling.			read text	
		I've got ***good reasons*** in there as well, haven't I?		evaluate		inquire accordance

directs perception (c1), *inquires reasoning* (c1, c3, c4), models reasoning (c2), and *invites reasoning* (c5). This exchange of conscious acts is crucial for fostering argumentative reasoning.

Meanings are negotiated in pedagogic relations and sourced in pedagogic modalities. It is through these tasks that learners construe the knowledge and values of curriculum registers.

The curriculum goal of this exchange is to enable access to the textual scaffold. Building intertextually on the Uncle Frederick perspective, each step of the TXXXC is explicitly focused, explained, elaborated, and evaluated (cycles 1–5). These steps are highlighted in bold in the transcript to indicate the kind of knowledge that is negotiated. The focused values are italicized to illustrate the social purposes that are exchanged through the pedagogic activity. They include, for example, extending ideas (c2), writing a good example (c3), have opinions (c4) and have good reasons for opinions (c5).

In an explicit teaching stage, the teacher's role is largely to impart knowledge and model reasoning. In this exchange, what is modelled in pedagogic relations is not just knowledge (c1) but reasoning—why certain choices are made.

5.2.2 Guided perspective-taking

In the guided writing stage, the central task is for the teacher and class to jointly construct Grandma's opposing perspective, about which students are later expected to write independently. The contrasting positionings bring different perspectives into contact with each other and enable students to deepen their understanding of points of view presented in the text. As Neil said in interview, "because they can all tell me things from the text but to actually think about it more deeply."

Table 5 shows an excerpt where Neil guides the class to construct on the whiteboard Grandma's perspectives based on a set of reasons discussed in the text. He *directs reasoning* about which reasons to use ("it is going to back up her argument?"), the relations between

Table 5. Guided Writing

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	But before I send you off to do that, we are going to have a discussion of what you think Lilly's Grandmother has got to say.	K1	prepare activity	enquire text	direct attention
		Lilly's grandmother — does she think whales are useful?	dk1	prepare reason	locate text	
	Ss	ye….no. No.		identify	recall text	
	T	What did she think about whales?	dK1	focus reason		inquire peception
	S1	They are as peaceful as the moon.	K2	identify wording	recall text	display perception
	T	I wish you had hand-up but I love what you have said: They are *as peaceful as the moon.* (reads as he writes)	K1	evaluate	write note	praise repeat
2	T	Some other things Lilly's grandmother thinks about them?	dK1	focus reason		inquire perception
	S2	They are wondrous creatures?	K2	identify wording	recall text	display perception
	T	*Wondrous creatures* (writes). Excellent.	K1	evaluate	write note	repeat praise
3	T	Any other things about whales, about what Lilly's grandmother thinks?	dK1	focus reason		inquire perception
	S3	They are as big as hills?	K2	identify wording	recall text	display perception
	T	But do you think that follows,		evaluate	remind prior move	qualify
		that it is going to **back up her argument**?	ch*	focus reason	query	direct reasoning
	Ss	No.	K2	propose		display reasoning

*checking (Rose, 2018, p. 5)

Table 5. Guided Writing (continued)

C	Sp	Transcript	Role	Phases	Sourcing	Interact
3	T	No	K1	evaluate		repeat
		She thinks they are lovely, peaceful and wondrous creatures.		elaborate	rephrase text	model reasoning
		It's not going to **back up the argument**, are they?		focus reason	query	
		Actually, that supports [Uncle Frederick's] argument. He says they are big whales and are useful.			recast prior move	suggest reasoning

reasons and the argument ("it's not going to back up the argument").

The curriculum goal of this guided writing episode is to prepare students for independent writing. The central task was for the students to reason about "What Lilly's Grandmother has got to say" as shown in Table 5. Neil *inquires perception* (c1, 2, 3), *directs, models* and *suggests reasoning* (c3). Students *display perception* and *reasoning* (c1, 2, 3) by recalling text: "They are as peaceful as the moon" (S1); "They are wonderous creatures" (S2); "They are as big as hills" (S3). In cycle 3, Neil focuses on the reasons provided by S3 and questions the underlying logic and validity of the reasoning: "is it going to back up her argument?" (c3). Students are reminded to reflect on whether the reasons they provide support Grandma's point of view. This approach is closely associated with the conception of argument as critical reasoning in that students are expected to

Table 6. Guided reasoning

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	But **why is it important that Lilly doesn't hunt whales.**	dK1	prepare reason	enquire learner knowledge	inquire reasoning
		Remember Lilly is the granddaughter, and grandmother is old. Uncle Frederick is older.	K1		remind text	direct perception
		Why is it important that they don't hunt the whales?	dK1	focus	enquire learner knowledge	inquire reasoning
	S	Lilly's grandmother is changed because if she hunts them she will turn out to be like Frederick. She doesn't want her to turn out like that.		identify	recall text	display reasoning
	T	I like the way you think. I wish you could use that example in your writing.	K1	evaluate		praise reasoning
		That would be fantastic, good girl.				praise
		I also like the way she uses **'because'**.			restate word	repeat

appreciate the logic underlying the connection between claims and reasons.

Explaining reasons in support of one's claims is a key component of argumentative reasoning (Kuhn & Udell, 2003). In the exchange presented in Table 6, Neil continues to guide children to reason about the significance of the stance that "Whales should not be hunted" through *inquiring reasoning* (e.g., "But why is it important that Lilly doesn't hunt whales?"). Learners are assisted through *reminding* ("Remember Lilly is the granddaughter, and grandmother is old. Uncle Frederick is older") and *restating* ("I also like the way she uses 'because'"). Guided collaborative reasoning such as this supports learning to argue by fostering students' understanding of the validity of the reasons they provide and ways in which convincing arguments are supported and explained.

Becoming skilled in evidence-based argumentation requires advanced understanding, a reflective way of knowing the purpose of claims, appropriate forms of evidence, and reasoning for justifying the use of evidence (Kuhn, 2010; Kuhn & Park, 2005). In the *Guided evidencing* exchange (see Table 7), Neil guides the class to discuss different types of examples ("a blue whale, a killer whale") and how they may be used as evidence to support Grandma's perspective. Neil draws students' attention to the knowledge about whales through a series of focus questions about prior lessons:

Table 7. Guided evidencing

C	Sp	Transcript	Role	Phases	Sourcing	Interact
1	T	Now I also want to talk a little bit about Examples.	K1	prepare feature	new teacher knowledge	impart knowledge
		You might think of some examples of when a whale is harmless, when a whale doesn't do anything wrong, or when whale is almost hunted to extinction.				suggest reasoning
		Give me an example of a whale.	dK1	focus sample	remind prior lesson	insist reasoning
	S	A blue whale.	K2	identify	recall prior lesson	display reasoning
	T	A blue whale.	K1	evaluate		repeat
2	T	What does a blue whale do?	dK1	focus attribute	remind prior lesson	inquire knowledge
	S	A blue whale sings.	K1	identify attribute	recall prior lesson	display knowledge
	T	Good. A blue whale sings.		evaluate		repeat
3	T	Does a blue whale eat people?	dK1	focus attribute	remind prior lesson	inquire knowledge
	S	No	K2	identify	recall prior lesson	display knowledge
		So you might say, for example, 'the blue whale is a huge creature that eats…	K1		recast	suggest reasoning
4		using…' what?	dK	focus attribute		inquire knowledge
	S	A baleen.	K2	identify	recall part	display knowledge
	T	Its baleen, good.	K1	evaluate		approve
5		So the Examples that you give, you may give an example of a specific whale that you looked at in your writing.		focus feature		suggest choice
		Ok?		receive		
6	T	So far, we talked about blue whales.		prepare	summarise	
		What some other types of whales we talked about?	dK1	focus sample	remind prior lesson	inquire knowledge
	S	Killer whales?	K2	identify		display knowledge
	T	Could you use killer whales as a good example?	K1	evaluate	enquire learner knowledge	approve choice
		You may say killer whales are beautiful creatures and really important to the … to the ocean.		elaborate		model reasoning

"Give me an example of a whale" (c1/dK1); "What does a blue whale do?" (c2/dK1); "Does a blue whale eat people?" (c3/dK1). The pedagogical goal is to model the role of examples in strengthening a reason: "the blue whale is a huge creature that eats using a baleen" (c3–4/K1); "killer whales are beautiful creatures and really important to the ocean" (c6/K1).

The knowledge exchanged here is facilitated by sources of meaning that are visibly present in the classroom: posters grouping different types of whales developed by students in this unit of work. It may be argued that making connections to the knowledge that has built up over the course of the term has supported the development of argumentative competence: have opinions and have reasons for opinions.

Discussion

This paper has examined pedagogic practices that support learning to argue in an early and middle primary classroom. Using the pedagogic register analysis framework, we examine practices that foster critical reasoning. Below we discuss ways in which learning to argue is conceived and supported as enacted in the classroom talks.

6.1 Arguing to resolve issues

Hirvela (2017) argues that effective pedagogy derives from teachers' conceptual understanding of argument. In both our classrooms, the curriculum goals centre on differing points of views that stem from an issue or problem requiring a resolution. In the Kindergarten classroom, students are engaged in discussing the issue of temptation and a possible consequential action arising from the reading text. The pedagogic activity involves learners taking a stance by performing a material action— walking to one side or the other (Table 2). Through the mediation of material actions, the practice of perspective-taking is presented as a situated, observable practice experienced and witnessed by all students. Thus, inferential thinking and reasoning are made visible and accessible to all.

In a similar vein, a central pedagogic activity in the Year 3/4 classroom is structured around interacting with and representing two contrasting perspectives on a moral issue—"Should the whales be hunted?". Throughout the lesson students attend to and examine two differing perspectives: that of Uncle Frederick and that of Grandma. Through the modelling activities (Tables 3 & 4), students learn to represent, explain, extend and support Uncle Frederick's points of view about why "whales should be hunted", using the model text written by Neil. The change of the position in the guided writing stage brings to light the existence of a different perspective on the same issue (Table 5). Neil guides the class to explore Grandma's perspective of why "whales should be hunted", by referring to ideas discussed in the story.

Argumentation involves reasoned negotiation of issues, questions and perspectives (Jonassen & Kim, 2010). One can argue that engaging with and reflecting on two-sided perspectives serves as an important introduction to the practice of engaging in an argument with others. In this study, pedagogic activities of inferencing, taking a stance, enquiring attitude and justifying reasons are woven together to mediate emergent understanding of argumentation practices through discussion and experience.

6.2 Reasoning together

The pedagogic register analysis of *interacts* and *sourcing*, along with the phasing under focus, shows how learning to argue is conceived by the teacher and the pedagogic practices employed to foster argumentative reasoning. For Neil, students need to have opinions and have reasons for opinions. The practice of critical reasoning is defined by the values given to points of view, justification and evidence.

The analysis of pedagogic relations provides novel insights into learner participation fostered by the teacher's choices of conscious acts (Rose, 2014, 2018). In both lessons Neil places emphasis on the importance of reasoning. In the Kindergarten classroom, processes of predicting, explaining and justifying are integrated into cycles of activities of the selected sequence (Tables 1 & 2). Students are invited to predict and perform a stance (Table 1) and repeatedly reason with the teacher through multiple instances of 'display reasoning' (Tables 2, 3).

The analysis of pedagogic modalities sheds additional light on the sources of knowledge or the kinds of evidence that are solicited from the students as they explain and justify their position (Table 2) or reasons (Tables 5, 6, 7). The study shows that even young children are able to reason with the teacher. Students draw on their personal or shared knowledge (textual evidence from the story) to justify their positions (Table 2). Neil guides critical reasoning by validating shared knowledge as a valued form of evidence.

This reasoning approach observed in the Kindergarten class is evident in that adopted in the Year 3/4 class. The analysis shows that Neil constantly inquires reasoning about different points of view. There is a discernable shift towards a more explicit pedagogy in modelling reasoning (Tables 6 & 7). Neil fosters reasoning by interrogating the connection between the claim and evidence: "it is going to back up her argument?" (c3, Table 5). Reflection on the connection renders a substantiated opinion into a reasoned argument. This form of critical reasoning is what underlies quality argumentation (Kuhn & Udell, 2003).

6.3 An integrated pedagogy

Kuhn and Udell (2003) argue that "implicit in argument as product is the advancement in a framework of evidence and counterclaims that is characteristic of argumentative discourse" (p. 1245). This means that an ability to produce written arguments depends upon thinking and reasoning skills in critiquing, explaining, justifying and evidencing claims.

Scholarship in linguistics has contributed to understanding of the important role of an explicit pedagogy in making visible linguistic resources required to formulate a written argument (e.g., Derewianka &

Jones, 2016; Martin & Rose, 2008). This paper shows that reasoned discussions can be integrated into the explicit pedagogy to support development of argumentative competence. Crucial to the design of guided collaborative reasoning are the choices the teacher makes in bringing sources of knowledge to support learning to argue. They include the use of a selected mentor text to build conceptual foundations of an argument (i.e., subject matter knowledge) (see Figure 2) and a teacher-authored text to develop shared understanding and alternative perspectives (Tables 3 & 4).

The teacher's orchestration of learner participation enacted through pedagogic relations is another important consideration in supporting learning to argue. In the Kindergarten classroom, pedagogic relations are enacted as *behaving* (Table 1) and *reasoning* (Table 2). The teacher's role is mostly *directing* and *inquiring*. In the Year 3/4 classroom, learner participation is distinctly structured as *reasoning* (Tables 3, 5, 6, 7), *perceiving* (Tables 4, 5), and *knowing* (Table 7). These cognitively oriented interactions are important means to foster more advanced critical reasoning in higher grades.

Learner participation in the form of cognitive engagement (*reasoning, perceivin*g) has implications for developing argumentative competence. Vygotsky's (1978) sociocultural theory conceives of development of higher order thinking as originating from classroom interaction. If, as suggested by Kuhn and Udell (2003), classroom discussion provides the "social scaffold" (p. 1258) for the development of critical reasoning, reasoned discussion has the potential to develop argumentative competence and writing. Guided collaborative reasoning that engages students in conscious acts of predicting, explaining, reasoning and justifying may contribute to the development of competency in argumentation.

Conclusion

Argumentative competence is a crucial resource by which students demonstrate their academic achievements and their capacity to be critical consumers and creators of knowledge. The pedagogic analysis provided in this paper makes a contribution to understanding some of the ways in which the capacity to argue well can be fostered through teacher-guided collaborative reasoning. The analysis identifies pedagogic practices the teacher can adopt to make visible the values and practices embodied in the act of argumentation through reasoned discussions about familiar mentor texts. These practices provide important means for enabling equitable distribution of educational opportunities, particularly to those less advantaged students (Rose, 2018, 2019). The findings of this study demonstrate that it is possible to engage young children in complex reasoning skills even in the earliest year of primary schooling through a combination of carefully designed mediational means including pedagogic activities, repertoires of learner participation, and multimodal resources.

A key concern about the potential of the teacher-guided collaborative reasoning is the opportunity for learners to initiate questions and take a critical stance (Clark et al., 2003). The findings of the study suggest although learners may not take on a primary knower role in the teacher-guided collaborative reasoning, they can actively participate in the tasks by being engaged in conscious acts of reasoning and perceiving. Admittedly, the pedagogical efficacy of this guided reasoning approach needs to be further examined through analysis of a larger corpus of classroom data. Nonetheless, this paper offers some initial insights into a possible productive approach to foster "the rhetorical flexibility" (Johns, 2017, p. 80)—argumentative competence that transfers to new contexts.

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