

## **In pursuit of a unified method to measuring classroom dialogue: The Dialogue Elements to Compound Constructs Approach**

### **Supplemental Materials**

**Results stage A (part 3.1): More detailed information of the coding tools chosen for review.**

#### **1. Low Inference Discourse Observation (LIDO)**

LIDO tool was developed Cathy O'Connor and colleagues to assess the quality of teacher and student talk moves (Michaels & O'Connor, 2015; O'Connor & LaRusson, 2014). The tool has been used in numerous studies, by the original (O'Connor & Al Adeimi 2018), as well as by other research teams (e.g., Garcia-Mila et al., 2021; Sandoval et al., 2018; Van der Wilt et al., 2022) to systematically analyze whole classroom and/or small group conversations on semi-structured learning tasks, across a variety of disciplinary topics, in the exact and social sciences.

The conversation is coded at the turn level, for on-topic conversation only (that is: when the talk is about the intended topic taught/learned). If a speaker turn is exceptionally long (usually teachers' speaker turns), then only the last part of the turn is considered. The LIDO framework contains a total of 11 mutually exclusive coding categories to assess quality of classroom dialogue: 6 teacher prompting moves (invite students' interaction, invite more information, get the speaker to continue talking, open question, semi-open question, and quiz-like/closed off question) and 5 student response moves (direct talk, indirect talk, claim with evidence, extended, and minimal).

#### **2. Science Discourse Instrument (SDI)**

The SDI was developed by a team led by Jonathan Osborne and Hilda Borko to capture features of argumentative discourse in science education classrooms (Osborne, 2015). It has been developed and used in a large-scale intervention research, focusing particularly on whole classroom, teacher-led argumentation in elementary school science classes (Borko et al, 2021; Fishman et al, 2017; Osborne et al., 2016; 2019).

For each transcribed lesson, two 15 *min*-long segments that contain at least 5 *min* of whole classroom discussion are selected for coding at the turn level. The SDI discerns between three teacher moves (ask, press and link) and three student moves

(explain, co-construct and critique). For each coded turn, coders then distinguish between two levels of execution (emerging practice or proficient use). Therefore, SDI includes a total of 12 variables.

### **3. Student Talk Moves (STM)**

The STM coding framework was developed by Jan Hardman in the context of a large-scale intervention project to encourage dialogic teaching in British elementary schools (Alexander, Hardman & Hardman, 2017). It has been used in studies to analyze dialogic episodes in whole-class discussions in language arts and social studies lessons (Hardman, 2019a; 2019b).

Each of the transcribed lessons is divided into episodes. Episodes that contain extended student contributions are then further coded at the turn level. The framework represents a reconceptualization of the IRF exchange format and offers subcategories in each of the main dialogue moves of questions (invitations), response and follow up. As teachers integrate much more complex invitations, the students' turns become more complex and varied in response. The initial categorization works by broadly identifying types of teacher questions (invitations), types of student response and types of teachers' follow up moves. Teachers' questions have a further subcategorization of seven different types, totaling in 8 teacher questions coding categories. Student responses are first categorized by the length of contributions. Next, 13 subcategories are used to minutely identify the exact form of extended student answers (e.g., whether they argue, repeat, challenge, or justify their own or their peers' contributions etc.), totaling in 14 students' response types. Finally, there are 3 categories to capture the teacher's follow up move (acknowledgment/reject, praise, comment). There is a total of 25 coding categories in the scheme.

### **4. Analyzing Teaching Moves (ATM)**

Building on decades of accumulated expertise, research and theory on academically productive classroom dialogue (Accountable Talk) at the University of Pittsburgh's Learning Research and Development Center (LRDC), the ATM framework was developed to investigate the effects of a coaching intervention on teacher facilitation of classroom discussions in upper elementary English language arts education (Correnti et al. 2015; Scherrer & Stein, 2013). ATM has been used in studies led by LRDC scholars (Correnti et al., 2019; Walsh et al., 2020), as well as other teams (e.g., Khoza & Msimanga, 2021).

Discussion transcripts are coded at the speaker turn level, with each turn receiving one coding category. In exceptionally long contributions, coders are instructed to give more than one coding category per turn when applicable (mainly long teachers' contributions). ATM contains a total of 29 coding categories, with separate codes for teacher and for student speaker turns. Coding categories for teacher talk moves are divided into two sets: The first are Initiating moves (9 coding categories), which intend to capture different teacher efforts to elicit student thinking and participation. This includes, for example, teachers launching an open-ended question, and teachers asking a literal question that has a specific answer. The second set of teacher move categories are 13 different rejoinder moves, which capture teacher responses to student contributions (e.g., recap, uptake or press). In addition, ATM includes 7 separate categories for capturing student responses (e.g., link, use of evidence or explanation). There is a total of 29 coding categories in this scheme.

### **5. Scheme for Educational Dialogue Analysis (SEDA)**

SEDA was developed at the Cambridge Educational Dialogue Research (CEDiR) center as a collaborative effort involving several leading scholars in APD (e.g., Sarah Hennessey, Christine Howe, Neil Mercer, Paul Warwick and others) to build on the longstanding tradition of research at Cambridge in this field. The tool was developed to assess the quality and outcomes of academic dialogue, across different settings, ages, topics, and disciplines (Hennessey et al., 2016; 2020; Hennessey & Howe, 2017; Vrikki et al., 2019). SEDA has been used for systematic analysis of whole classroom discussions in different countries, including non-English speaking ones (e.g., Rojas-Drummond et al., 2016; Firer et al., 2021)

In SEDA, classroom discourse is coded at the turn level. In total, there are 33 communicative acts or gradable variables in the original SEDA framework. The codes are not mutually exclusive, yet in most cases, a turn is coded with a single coding category. In complex or longer speaker turns coders may combine codes to capture a situation more accurately. For example, the code 'I2 – invitation to building on' can be combined with 'C1 – referring back' where the invitation is to refer specifically to something that was said before. In total the scheme includes 33 coding categories.

### **6. Peer to peer argumentation (P2PA)**

The P2PA (this abbreviation is ours, it was not offered by the designers of the coding scheme, but we had used it when discussing the various schemes and

comparing among them). The coding scheme was developed by Deanna Kuhn and colleagues to assess aspects of peer-to-peer argumentation, mostly in dyadic, peer collaboration set-ups in middle school classrooms (Kuhn & Felton, 2001; Kuhn, Shaw & Felton, 1997). This tool has been iterated, refined and applied many times over the last 25 years, in different settings and discussion topics from social dilemmas to science concepts (Iordanou & Kuhn, 2019; Kuhn et al., 2008; Kuhn & Moore, 2015; Kuhn & Udell, 2003). Though this scheme was not originally designed to capture whole classroom discourse, it has been used in this capacity as well (Crowell & Kuhn, 2014).

Each discussion is transcribed and parsed into dialogic situations (moments in the discourse in which deeper and more critical thinking had occurred). These are then coded at the speaker turn level (one code per turn). The framework contains coding categories for eight different types of transactive questions (for example, *Clarify?*, which is a request to the discussion partner to clarify his or her previous utterance) and for 16 different transactive statements (for example, *Counter A*, a disagreement with the partner's immediately preceding utterance, accompanied by an alternate argument). In addition, there are 10 meta-level coding categories, meant to differentiate between different types of 'talk about talk' (for example, *Meta Clarify* meant to capture instances where someone recognizes and talks about a clarification move made. Or *Meta argument*, meant for cases where someone talks about an argument). In total, P2PA includes 34 coding categories.

### **7. Israeli Pedagogy classroom discourse (IP)**

The IP framework was developed by Ben Gurion University researchers to systematically analyze features of classroom discourse in Israeli Hebrew-speaking settings, and informed by ethnographic description and linguistic analysis (Pollack, Segal & Lefstein, 2015). It has been used in different studies to analyze and characterize teacher-led, whole classroom discussions (primarily in language arts lessons) (e.g., Becher & Lefstein, 2020; Lefstein, Louie, Segal & Becher, 2019; Segal & Lefstein, 2016).

Conversations are transcribed and coded at the turn level. The framework contains different coding categories for teacher and student contributions (30 and 15 respectively). Student coding categories include separate categories for correctness of content (right or wrong), the manner of their answer (allocated turn or not), and the

epistemic nature of the answer (e.g., claims, evidence, challenge or referencing). The second set of 30 coding categories refer to teacher speaker turns and includes among others categories for different question types, types of teacher evaluations of student contributions, and follow up moves. In total, there are 52 coding categories in the framework.

**Results stage C (Part 3.3): Dialogic elements found in existing coding categories.**

Table 1. *Dialogue Elements shared across all seven coding frameworks examined*

	LiDO	SDI	STM	ATM	SEDA	P2PA	IP
Invitation	T4 Open Q	Ask – open	CSQ - closed	Inference and	I1 & I4 Invite	Agree?	Teacher Open Q
	T5 Semi open Q	questions with	student question	analysis Q	explanation	Clarify?	Closed Q
	T6 Closed Q	plural potentially	OSQ - Open	Literal Q (open	I2&I6 Inv. Elaborate	Justify?	Recitation Q
	S4 student	valid answers	student question	form, part open)	I3&I5 Inv. Possibility	Meta?	Probe Q
	content question			Gist Q	RD3 Inv. Reflection	Position?	Uptake Q
				Strategy Q	E1 Inv. Opinion	Probe?	Repeat Q
				Skilled based Q	C4 Inv. Inquiry	Question?	Procedural Q
			Reinitiate	beyond lesson	Respond?	Student procedural Q	
Reasoning	P6 – State position S3 – student provides reasoning to support claim	Co-construct – build on other ideas	SE/JUS - justifies, provide reasoning SArg –states an opinion or position.	Think Aloud	R1&R2 Justify	Justify?	Teacher Claim
				Press (same student)	contribution	Position?	Student Claim
				Uptake/push	I1 invite reason	Meta-	
				back (different student)	I5 invite hypotheses	argument	
					R3&4 speculate or predict		
Refer	S1 – address another student. S2 – refers to another’s contribution	Link – relate contribution to another. Co-construct – build on other ideas	SCon – connects, makes reference to something else.	Invite S link	C1 – refer back.		T invite peer feedback.
				Recap	C2 – make learning trajectory explicit		T link outside knowledge.
				Synthesize	C3 – Link to wider context		Student address directly.
				S strong Link	C4 – invite inquiry beyond the lesson		Student address mediated.
			P1 synthesize ideas			Student link outside knowledge	

Elaboration	T2 – asks for clarifications T3 – get students to continue. S5 – student elaboration	Press – encourage student to elaborate. Explain – student provides explanation.	SE/add – elaborated answer. SE/ana – explain in detail.	Think Aloud Provides Information. Stopping Point S strong explanation	R1&R2 -explain B1&2 – clarify I1 invite explanation P1 – synthesize ideas	Clarify Continue Extend-O Interpret	Procedural explanation. Topic explanation. Recap follow up Re-voice follow up Clarification/informative follow up Summary follow up Generalization follow up
Evidence	S3 – student provides evidence to support the claim.	Revolves around scientific evidence Press – encourage students to answer with reasons and evidence	SJus –justify – provide reasoning and evidence.	S Strong text-based evidence	I4 ask for justification (Evidence) R1&R2 evidence to support claim G3 -Introduce authoritative perspective	Justify? Counter A	Connecting knowledge/ life outside of the formal learning material.
Simple	S6 – turn is simple clause or less		BSC – brief student contribution	Literal uptake S weak Link S Weak Text based Evidence S Weak explanation Terminal	E2- Make another relevant contribution	Null Unconnect Restart	Procedural Q Student procedural Q Wrong but relevant ans Non relevant remark.
Evaluation		Emerging practice of constructive criticism entails feedback	SEval – evaluates, makes judgements.		I2 – invite evaluation of another’s contribution or view. P2 – Evaluate alternative views G4 – Provide informative feedback	Dismiss Coopt	T invite peer feedback Explicit positive Fdbk Explicit negative Fdbk Implicit positive Fdbk Implicit negative Fdbk Neutral Fdbk Combined Fdbk Correct

Challenge	Critique –students challenge or critic ideas	SChal – challenge or counter argue.	Press Uptake/ push back	P5 – challenge viewpoint. P6 – state disagreement I2 – invite disagreement	Counter A Counter C Disagree	Explicit teacher disagreement. Challenge the teacher. Critique – the extent to which students challenge or critic ideas
Repeat		SRep –rephrase, repeat, reformulates	Repeat Collect – gather additional responses		Interpret	Repeat/Repair teacher question. Recap

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Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
23	Meta clarify task	Talk about talk. Reference to clarification of the task.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
24	Meta scenario	Talk about talk. regarding the scenario.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
25	Meta clarify	Talk about talk, regarding clarification of the content.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
26	Victory claim		N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
27	Null	An unintelligible or off task utterance	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
28	Refuse	An explicit refusal to respond to the partner's preceding utterance	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
29	Respond	The answer to a question? Which does not advance or clarify the speaker's position.	S			●				●		
30	Restart	A statement following a string of utterances coded null that attempts to re-engage the partner in conversation about the topic.	S	●		●						
31	Unconnected	An utterance with no obvious connection to the immediately preceding utterances of either the partner or the speaker. non transactive statement, when the speaker fails to connect to either the partner's or his own last utterance, breaking from the preceding conversation and introducing a new argument or a thought.	S							●		
LiDO (Michales & Oconnor, 2018)	T1 - Teacher gets student to respond to another student's turn	Should include unambiguous evidence that the teacher is asking students to respond to one particular student's contribution. If the teacher's question follows immediately after the student has spoken, then a phrase like 'who wants to respond to that idea' might be sufficient. If the teacher's question does not follow immediately, it should include an explicit reference to the student who spoke	T	●		●						●
2	T2 - Teacher asks student to explain, clarify or provide reasoning.	Teacher follows up on a response from a specific student and asks them to clarify, expand, explain or even address a new content question. The utterance must address the previous speaker and there must be a follow up with that same student. T2 includes any kind of follow up to the same student - new questions, pressing for reasoning, expansions etc.	T	●	●	●						

Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
3	T3 - Teacher attempts to get student to continue speaking	Teacher's response get student to continue by using backchanneling signals - uh huh, that's interesting. no new content or questions. If the teacher's response isn't followed by another turn from the same student- it's not T3-	T	●	●							
4	T4 Teacher poses truly open, contestable question	scaffold dialogic discussion among students - get them to question, contest, agree or oppose, seek more evidence. Quite rare in the discussion, support delving into reasoning, allows students to take position and support their claim.	T	●			●		●			
5	T5 - Teacher poses semi open question, with a circumscribed answer set.	not a single right answer, but not totally contestable. Small set of data or facts, some latitude for exploration of ideas. For example - procedural answers that vary a little, or series of steps that different students contribute to. But there is a desirable set of answers. there could be different sources of evidence, often based on text or activity. Won't create a debate. Context (age of participants) is important to decide if its T5 or T6.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
6	T6 - Teacher poses a closed question	Uncontestable question, or a test content question (one right answer or yes/no question)	T	●						●		
7	S1 - Student addresses another student	unambiguous evidence that one student directly address another - name/you. It could be mediated by the teacher. Only on relevant instruction material (no name calling). If a student addresses another directly after they spoke, doesn't have to include a name or you.	S			●						
8	S2 - Student refers to another student's contribution in some way	cites or responds to what another had said, but with no evidence of direct address. Should have explicit refernce to the content of the previous contribution, which can include the name of the student but doesn't address her specifically. A useful test: imagine the interaction without the first utterance - would the 2nd student's word still make sense? if yes - it's not an explicit reference.	S									●
9	S3 - Student provides evidence or reasoning to support their claim.	student claim, teacher asks for reasoning, the student provides it. If there was a collective response (who agrees?) but one student provides reasoning it's S3. Often unclear if it's a claim or reasoning. Useful rule of thumb - because/that's why - it's S3. BUT it has to be in support of his own claim, not another's	S				●		●			

Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
10	S4 - Student elaborated turn, longer than a simple clause.	when S1-3 do not apply, but the student's response is longer than a simple clause (has more than one main verb)	S		●							
11	S5 - Student asks the teacher a question about lesson content.		S	●	●							
12	S6 - Student's turn in simple clause or less.	when S1-3 do not apply, but the student's response is longer than a simple clause (has more than one main verb)	S							●		
SEDA (Hennessey et al., 2019)												
	Invitation 1	Ask for explanation or justification of another's contribution	S/T	●		●			●			
2	Invitation 2	Invite building on/ elaboration/ (dis)agreement/evaluation of another's contribution or view (uses previous response to elicit more)	S/T	●	●	●						
3	Invitation 3	Invite possibility thinking based on another's contribution (speculation, imagining, hypothesis. Must include an explicit link to ideas expressed)	S/T	●		●	●					
4	Invitation 4	Ask for justification (evidence, explanation, or reasoning - not just ideas or views)	S/T	●					●			
5	Invitation 5	Invite possibility thinking or prediction (speculations. Ideas, explorations with a basis of reasoning)	S/T	●			●					
6	Invitation 6	Ask for elaboration or clarification or extension or examples - Probe (the difference from I4 is that here we do not ask for more ideas but just to explain what they said)	S/T	●	●							
7	Reasoning 1	Explain or justify another's contribution - provide elaborate justification or evidence or explanation of another's reasoning or the process of arriving at a solution	S/T				●	●	●			



Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHL NG	EVD	SMP	EVL	RPT
19	Connect 1	Refer back to prior contributions or observations ore knowledge objects or discussions after contributions – explicitly reviewing, referring or bringing in a specific contributions	S/T			●						
20	Connect 2	Make learning trajectory explicit – providing continuity within and across lessons, including highlighting relevance to prior or future activities.	T <sup>1</sup>		●	●						●
21	Connect 3	Link learning to wider contexts. Bringing knowledge from outside of the classroom or school (beyond, before or after the current lesson) into the discussion of what is being learnt. Relates to the temporal dimension of learning (inter textual/inter-contextual.	S/T		●				●			●
22	Connect 4	Invite inquiry beyond the lesson – ask others to pursue their own inquiry before or after the lesson. Sustains and extends the dialogue across time and space.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
23	Guide 1	Encourage student to student dialogue – allocating the responsibility to students for the dialogue or activity. Must include a dialogic element in the invitation.	T	●		●						
24	Guide 2	Propose action or inquiry activity – propose a course of action in the context of a dialogue or collective activity	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
25	Guide 3	Introduce authoritative perspective – explicit introduction of explanation in response to participants' level of understanding.	T		●				●			
26	Guide 4	Provide informative feedback - formative/diagnostic feedback, not simple positive/negative or non-committal. Or mere repetition. May be used alongside B1 to indicate the exact sort of feedback (=***we can reconstruct by combining evaluation with reasoning/evidence/claim)	T						●		●	
27	Guide 5	Focusing directing the dialog in a certain wanted direction. Through questions. Pointing salient information/another direction/clarifying the task/scaffolding. NOT for simple reading the task aloud. Can be used in combination with other codes to distinguish between types of focusing	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a

<sup>1</sup> This combination is identical to P1 however, while recap move can be done by a student (probably not often), only a teacher is in a position to make the learning trajectory explicit.

Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
28	Guide 6	Allow thinking time (not verbally explicit) an explicit invitation to pause, can be executed implicitly when there's at least 3 second pause after an invitation.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
29	Express 1	Invite opinions/beliefs/ ideas	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
30	Express 2	Make other relevant contribution	S/T							●		
31	Reflect 1	Talk about talk	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
32	Reflect 2	Reflect on learning process/purpose/value/outcome	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
33	Reflect 3	Invite reflection about process/purpose/value/outctome of learning	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
SDI (Osborne et al., 2019)	Teacher Ask emerging	This category characterizes the degree to which teachers ask science questions which generate diverse views. Emerging practice - generate diverse responses and support use of evidence and reasoning.	T	●	●							
2	Teacher Ask Proficient	Open end questions to generate productive discourse/ elicit diverse student response. Plural potentially valid responses. No self-evident better answer. Foreground difference and generate cognitive conflict. Production questions are open ended and sufficiently puzzling that they cognitively engage students and lead to diverse student response.	T	●			●	●				



Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
3	Teacher Press emerging	asking for clarification or elaboration (can you say more? what do you mean by ___? is there another word for that?) asking for additional information in the form of a short phrase like observation or memorized knowledge/ revoicing with opportunity to clarify or elaborate (the teacher rephrases a student's comment and asks 'is that what you mean?'). more than simple restating. requires some degree of paraphrasing, rewording, synthesizing, summarizing of students' comments. if revoicing is the only type of press - Proficient use - asking for evidence or reasoning (what's your evidence? why do you think that? does that related to an experiment we did?)	T	●	●							●
4	Teacher Press Proficient	critiquing a student's comment or playing devil's advocate to press for evidence or reasoning (would that also be true at nighttime? is one trial enough to draw that conclusion? but the leaves are growing, are they alive?). Juxtaposing ideas, without consolidating them. Asking students to build on each other's ideas (can anyone build on what John just said?). Asking students if they agree or disagree with a contribution (John, do you agree with that?). Publicly documenting ideas in a way that does not consolidate them (list/word cloud). Idea line up, four corners or other structural activities that allow students to show through placement of their body agreement or disagreement with each other or the presented claims. but only if these activities aren't followed by attempts to consolidate the ideas.	T	●			●		●			●
5	Teacher Link emerging	Summarizing ideas that consolidates, also known as signposting (It seems like we have two major camps in this discussion). Demonstrating how two ideas are similar or different (It sounds like John and Kikela are both saying that density is what makes the water sink). Highlighting a particular student contribution for others to comment on (I want to go back to what Mikela said earlier about the land heating up faster than water). Documenting students' ideas but in a way that consolidates them (organizes, cluster of ideas).	T			●		●				●
6	Teacher Link Proficient	Observations without explanations (I think that the hot water is rising to the top of the beaker), Claims without evidence or reasoning (I don't think that would happen during the day, only at night). Incomplete or irrelevant explanations.	T		●		●					●
7	Student Explain emerging		S		●					●		



Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
5	Heckling criticized -	student's permission to speak student breaks into the discussion but the teacher criticizes the attempt.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
6	Backstage interruption -	student's permission to speak – when students interrupt the discussion in the background. Should not include nonverbal interruptions.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
7	Correct -	student's response to teacher the decision is made by the researcher, the teacher might classify the answer as wrong, but still code by what the researcher believes is the right answer.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
8	Wrong but relevant -	student's response to teacher	S							●		
9	non relevant remark -	student's response to teacher	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
10	Mediated through the teacher -	Student address another student – The student answers the teacher but relates to what another student had said.	S			●						
11	Direct -	student address another student – the student answers his peer directly after being allocated permission	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
12	remark	Meta pragmatic student – students commenting on the use of language and communication, for example – complaints about not being allocated a turn in the dialogue.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
13	Procedural	student question – asking the teacher for clarification on an assignments or with regards to other class work allocated.	S	●						●		
14	Essential	student question – asking content questions, clarification requests with regards to ideas and preceding turns.	S	●	●							
15	Introducing new topic -	Relatively rare and complex student's turn, hard to identify	S				●					

Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHL NG	EVD	SMP	EVL	RPT
16	Linking to outside knowledge -	student's comments	S						●			
17	Claim -	student's comments is composed of premises (stance, position) and conclusion (Reasoning or evidence)	S				●		●			
18	Explicit disagreement -	student's comments	S					●				
19	Correcting language -	student's comments	S		●					●		
20	Student acting as a teacher -	student's comments – participation that breaks the boundaries of expected roles in the class.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
21	Procedural	explanation – teacher – clarifying tasks, allocating classwork and assignments.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
22	Topic	explanation - teacher	T		●				●			
23	Allocate/refuse permission to speak -	Meta Pragmatic teacher – commenting on the use of language and communication. This captures teachers' disciplinary remarks in the classroom.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
24	Other	- Meta pragmatic teacher	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
25	Recitation -	teacher question – a limited range of acceptable answers, all known in advance to the person asking the question	T	●						●		
26	Open	teacher question – the teacher doesn't seem to know in advance the right answer.	T	●			●					



Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
38	ReVoice -	teacher follow up the teacher repeats what was said, but also clarifies it, and then refers to the original speaker to ask for their validation of her clarifications (is that what you meant?)	T	●	●	●					●	●
39	Clarification/informative -	teacher follow up the teacher provides more information on the student's response, either by naming it, adding the next logical step, or linking what was said to more information.	T		●				●			●
40	Invitation to peer feedback -	teacher follow up	T	●		●						
41	Summary follow up -	teacher follow up –teacher aims to move on, politely, explicit intention to finish up (everyone has very nice answers but I want to move on). The teacher provides the right answer and stops the discussion.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
42	Recap	teacher follow up Repeating and clarifying the answers that student had said, without evaluating.	T		●	●						●
43	Generalizing -	teacher follow up repeating and clarifying the answers that students had said, then returning the new information for discussion.	T	●	●	●						●
44	Content of response -	teacher follow up- teacher addresses the content, points out what was missing in terms of information (i.e. you should have included this reason in your answer)	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
45	Manner of response -	teacher follow up – the teacher addresses the way the student used the strategies offered to him (i.e. you should have re-read the text before answering)	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
46	Personal -	teacher follow up – a feedback that adds a personal remark pertaining the student's personal trait. (you're an excellent student)	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
47	Combined -	teacher follow up – a feedback that relates to several things at once, (what you said now relates to the importance of clarifying our aims when we're comparing opinions, excellent!)	T		●	●					●	
48	Linking to outside knowledge -	teacher comments connecting the answer to outside knowledge, facts or information	T			●			●			

Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
49	Claim -	teacher comment is composed of premises (stance, position) and conclusion (Reasoning or evidence)	T				●		●			
50	explicit disagreement -	teacher comments has to be explicit disagreement with previous turn	T					●				
51	correcting language -	teacher comments simple language corrections	T		●					●		
52	Teacher acting as a student	participation that breaks the boundaries of expected roles in the class.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
ATM (Correnti et al., 2020)	Inference and analysis Q -	Teacher initiating move Inference and analysis require students' to construct knowledge that goes beyond what is directly stated or represented in the text itself (therefore require analysis/high level inference)	T	●			●		●			
2	Literal Q -	teacher initiating move a question that asks for the retrieval of factual information. The teacher often is looking for a specific answer. if a question can be answered by simply retrieving a fact or piece of information then code as literal. Teacher asks questions 'fill in the blank' style - code as literal.	T	●						●		
3	Open form literal function Q -	teacher initiating move Q asks Ss to demonstrate a literal understanding of a very limited portion of the text. Open Form Literal Function Q's are open-ended in form but are preceded by a chunk of text that contains only a small amount of information invite only literal responses from the students. The text that precedes these questions contains only a small amount of literal information	T	●					●	●		
4	Partially open ended Q -	teacher initiating move Q asks Ss to demonstrate understanding of a particular section of the text. The content of Partially Open-Ended Q's includes specific information about, or guidance towards, particular ideas (i.e., provides information or clues as to what is significant about a certain section of the text) OR they are open questions that ask Ss to grapple with a relatively narrow slice of information within the text OR would invite answers/speculation not grounded in the text (e.g., predictions, talking about personal experiences, etc	T	●	●					●		





Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
15	Lot -	teacher rejoinder move T acknowledges S response and states that the class will deal with the idea later.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
16	Repeat -	teacher rejoinder move T echoes S response.	T			●						
17	Collect -	teacher rejoinder move T attempts to gather additional responses to a Q.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
18	Literal Uptake -	teacher rejoinder move T asks a literal Q using a S response.	T	●		●						
19	Uptake/Push back -	teacher rejoinder move T uses a S response to extend, deepen, clarify, or elaborate the discussion. Or T challenges the response in order to encourage Ss to rethink/defend their responses.	T	●	●							●
20	Press -	teacher rejoinder move T asks the same S follow-up Qs (i.e., uptake/push-back Q's, request for text-based evidence and explanation).	T	●			●					●
21	Invite students to link -	teacher rejoinder move T suggests there is more to a response and invites Ss to link or connect their ideas with ideas that have come before.	T	●		●		●				●
22	Recap or synthesize students ideas -	teacher rejoinder move T links multiple Ss' ideas or positions. T synthesizes multiple responses.	T		●	●						●
23	New participant	Student A S who is participating in the discussion for the first time.	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
24	Weak link	Ss attempt to link contributions to each other, but do not show how ideas/positions relate to each other. The S might simply be revoicing or repeating another S's contribution.	S			●				●		
25	Strong link	Student connect their contributions to each other and show how ideas/positions shared during the discussion relate to each other. Ss elaborate, challenge, or build on each other's ideas.	S		●	●						●

Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
26	Weak Text based evidence	Student Ss provide inaccurate, incomplete, inappropriate, vague, or trivial evidence from/reference to text	S						●	●		
27	Strong text based evidence	Ss provide accurate, appropriate, specific evidence from/reference to text that supports claim.	S						●			
28	Weak explanation	Student S provides a brief or circular explanation that basically repeats or restates the response or relies on evidence to speak for itself.	S		●					●		
29	Strong explanation	Student Ss provide an elaboration/justification of their answer or of the evidence they selected to support their answer.	S		●							
STM (Hardman, 2019)	Teacher closed question	Teacher asks a closed/recall question - allows one possible response	T	●						●		
2	Teacher open question	Teacher asks an open/authentic question - allows various responses	T	●			●					
3	Teacher acknowledgment/rejection	Teacher simply accepts or rejects a student's contribution	T							●		
4	Teacher praise	Teacher praises a student's contribution	T								●	
5	Teacher comment	Teacher remarks, summarizes, reformulates, builds on and/or transforms a student's contribution	T		●	●						
6	Teacher add-on question	Teacher asks student to add on to another student's contribution	T	●			●					●



Tool name	Category's name	Description for coders	S/T	INV	ELB	RFR	RSN	CHLNG	EVD	SMP	EVL	RPT
17	Student Challenge	Student provides a challenge or counter example	S					●				
18	Student Shift position	Student indicates a change of mind or perspective	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
19	Student Connect	Student makes an intertextual reference to something else (previous discussion, another text, evidence).	S									●
20	Student explain	Student explains something in some detail or examines own or another students' contribution (not to convince or persuade)	S		●							
21	Student rephrase	Student repeats, reformulates or summaries own or another	S		●	●						●
22	Student recount	Student gives an account of an event or experience	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a	N/a
23	student evaluate	Student makes a judgement	S								●	
24	student argue	Students states a position/opinion/argument (to convince/persuade)	S				●	●	●			
25	student expand/add	Student says more by building on, adding to or extending own or another student's contribution	S		●		●					●