# Relating Mathematical Understanding to Oral Language Proficiency: Elementary Teachers' Ratings of Student Mathematical Explanations

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## Abstract

In today's academic standards, mathematics proficiency relies on students' linguistic competence in explaining the procedures leading to their solutions. In this study, elementary-aged students (*n*=192) orally explained the process by which they found a total number of cubes. Teachers then rated the degree to which these explanations demonstrated evidence of students' mathematical procedural knowledge. We compared teacher ratings and examined how students' procedural knowledge related to various oral language measures. Teacher ratings of procedural knowledge differed based on students' English Learner status, grade level, and the mathematical strategy they used. Teacher ratings were closely related to students' language sophistication in four areas: sentence sophistication, establishment of advanced relationships between ideas, vocabulary, and stamina. Implications for instruction and formative assessment are discussed.

## Objectives

Under new College and Career Ready Standards, students are expected to display their mathematical understanding by justifying their procedural choices and solutions, thereby relying on their language abilities to demonstrate mathematical content knowledge (National Governors Association Center for Best Practices, Council of Chief State School Officers [CCSSO], 2010). In this paper, we aim to better understand the important role that students' language plays in teachers' evaluations of their mathematical procedural knowledge. As teachers use formative assessment in their math classrooms, it is possible that their evaluation of students' math knowledge may be influenced by students' expressive language skills. This may impact not only English learner (EL) students, but also English-Only or English-Proficient (EO/P) students.

For the current study, elementary school students provided oral mathematical explanations that were then rated on a number of language features as part of a larger research project on language progressions. Classroom teachers then rated the degree to which students' explanations showed evidence of their mathematical and procedural knowledge. The goal of the current study is to detect group differences in the teacher ratings and examine how teachers' evaluations of student mathematical procedural knowledge relate to students' performances on the language features. In particular, the current study aims to answer the following questions:

*1) How do teacher ratings of student mathematical procedural knowledge differ based on demographic and contextual variables (EL status, grade, and math strategy being explained)?*

*2) What is the relationship between the linguistic sophistication of students' mathematical explanations and teacher ratings of those students' procedural knowledge based on the explanations?*

## Perspective/Theoretical Framework

The *English Language Proficiency Development Framework* emphasizes the relevance of explanations as an important language function across academic content areas (CCSSO, 2012), including mathematics (Hill, Charalambous, & Kraft, 2012). When students provide explanations about mathematical procedures, they are required to organize and clarify their thoughts, become aware of their misunderstandings, and develop new understandings (Franke et al., 2007; Webb & Mastergeorge, 2003). By engaging in explanatory discourse, students actively participate in the classroom community, which, according to a sociocultural theoretical framework, is essential for math learning (Moschkovitz, 2002). Producing these mathematical explanations, however, can prove a challenge for students, as the requisite metacognitive understanding is particularly difficult for children (Cavanaugh & Pelmutter, 1982; Wilson & Clarke, 2004). Previous findings from the larger research project established that when elementary-aged students explained their procedures for solving a mathematics task, EL students were rated lower than EO/P students on the language features, although both groups struggled to provide explanations that were linguistically coherent and cohesive (Bailey, Blackstock-Bernstein, & Heritage, 2015). Additionally, EL students have historically received lower scores on standardized mathematics assessments than their English-proficient peers, possibly due to the receptive English language demands of test items (e.g., Abedi & Lord, 2001; Butler, Stevens & Castellon, 2007). With the new math standards, teachers will be formatively assessing students' math knowledge through their productive English language skills; therefore, understanding the interplay between math and language will be essential for the fair assessment of both EL and EO/P students.

## Methods and Data Sources

### Participants

Participants in the current study (*n*=192) were kindergarten, 3rd, and 5th grade students from five elementary-level schools in Southern California (see Table 1 for sample characteristics). Schools were diverse in terms of socioeconomic status, race/ethnicity, and language background. The sample was linguistically diverse, with 89 (46%) EL students. Spanish was the first language (L1) for all EL students whose teacher or school reported an L1 (*n*=77). The UCLA Institutional Review Board approved the study, and parent consent forms and child assent were obtained from all participants. Demographic data were requested from the school/district and from students' teachers in order to obtain students' gender, birth date, ethnicity, and English language learner (EL) status.

Table 1
*Student Demographic Information, Total Sample and by EL Status (N=192)*

| Demographic | Total Sample (%) (N=192) | Mean Age in Years (SD)[a] | *English Learner* (*n*=89) | *English-Only/ Proficient* (*n*=103)[b] |
|---|---|---|---|---|
| Gender | | | | |
| Male | 93 (48) | 7.81 (1.99) | 38 | 55 |
| Female | 99 (52) | 8.29 (2.06) | 51 | 48 |
| Grade | | | | |
| Kindergarten | 72 (37) | 5.71 (0.27) | 33 | 39 |
| 3rd grade | 61 (32) | 8.49 (0.61) | 32 | 29 |
| 5th grade | 59 (31) | 10.48 (0.37) | 24 | 35 |
| Race/Ethnicity | | | | |
| African-American | 9 (5) | | 0 | 9 |
| Asian | 22 (12) | | 5 | 17 |
| Caucasian | 31 (16) | | 2 | 29 |
| Hispanic/Latino | 106 (55) | | 79 | 27 |
| Multiracial/ethnic | 19 (10) | | 3 | 16 |
| Unspecified | 5 (2) | | 0 | 5 |

[a] A mean age of 8.5 is equivalent to 8 years; 6 months
[b] Includes 5 former EL students (Reclassified Fluent English Proficient, RFEP)
Note: The four public schools had a range of 35% to 99% of students eligible for free or reduced-priced lunch.

**Procedure**

Sessions were conducted one-on-one with a researcher in a quiet room or hallway on school grounds during the school day. Students were presented with a quantity of plastic interlocking blocks and asked to use any method to find the total number (see Figure 1). Meanwhile, the interviewer completed a Math Strategy Checklist that summarized the procedures the student was using and added detailed notes on the student's interaction with the cubes.

Upon reporting their answer, students were given a series of oral prompts, the last of which was used to elicit the mathematical explanations used in this study's analysis: "*Pretend you are talking to a classmate who has never done this activity. When you're ready, tell him/her how to use the cubes to find out how many there are and why using the cubes this way helps* *him/her*." The language and cognitive demands associated with the task were deliberately designed to be decontextualized, requiring students to explain their chosen processes to a hypothetical student who is not present. Sessions were audio recorded and transcribed verbatim. Some students completed the task a second time 6-8 months later, resulting in 298 explanations to be included in analysis for the current study.

*Figure 1.* Participant chooses to array cubes, implements multiplication strategy, and is prompted for explanation of procedures (photograph used with permission).

**Measures**

**Mathematical strategy.** Students' problem-solving strategies were coded based on the completed Math Strategy Checklists as either counting, addition/repeated addition, or multiplication (Bailey, Blackstock-Bernstein, & Heritage, 2015).

**Teacher rating**. Five K-4$^{th}$ grade teachers who participated in the larger project's professional learning community rated student math explanations for evidence of mathematics procedural knowledge for the current study. Their teaching experience ranged from four to 21 years. They rated transcripts using a protocol developed jointly by researchers and one of the participating teachers. The protocol included a four-point rubric for the teachers to rate math explanations and at least one anchor explanation for each score point. Scores on the rubric ranged from 0-3, as shown in Table 2. Explanations receiving full credit (*Level 3*) had to contain certain required steps for a given strategy.

Table 2
*Teacher Rating Rubric Levels and Descriptors*

| Level | Description |
| --- | --- |
| 0 | There is no evidence of a strategy for finding the number of cubes |
| 1 | Student's explanation for finding the number of cubes does not follow a clear mathematical procedure<br>• Missing several key steps |
| 2 | Student's explanation for finding the number of cubes has some procedural clarity<br>• Missing only one or two minor steps |
| 3 | Student's explanation finding the number of cubes has procedural clarity<br>• Includes all necessary steps for someone else to readily replicate their chosen strategy for completing task (see below)<br><br>**<u>If Counting</u>:**<br>• Organizing the cubes, e.g.:<br>  • In a line<br>  • Pushing/moving aside<br>• Showing 1-to-1 or 2-to-2 correspondence<br><br>**<u>If Repeated Addition</u>:**<br>• Grouping cubes<br>• Counting number of cubes in each group (e.g., 10)<br>• Skip counting by the number of cubes in each group (e.g., "10, 20, 30…")<br><br>**<u>If Multiplication</u>:**<br>• Grouping/arranging cubes<br>• Counting number of cubes in each group (e.g., 10)<br>• Counting number of groups (e.g., 5)<br>• Multiplying the number of groups by the number of cubes in each group (e.g., 5x10=50) |

Explanations were randomly assigned to each teacher. Ten percent (*n*=50) of all explanations in the larger project were randomly selected to be double coded for reliability between pairs of teachers. Inter-rater reliability was moderate (mean Cohen's kappa = .45; Landis & Koch, 1977). The pairs of teachers resolved any disagreements through consensus before rating their remaining explanations independently.

**Linguistic and discourse feature coding.** Researchers coded students' explanations for salient language features that had emerged from analyses conducted for the larger project (Bailey & Heritage, 2014). Characteristics were coded at the word, sentence, and discourse level in seven distinct linguistic and discourse features that represent students' increasingly controlled linguistic abilities in explanations. See Table 3 for the features and brief descriptions.

Table 3
*Language Features and Descriptors*

| Feature | Description |
|---|---|
| Sophistication of topic vocabulary | Small core topic vocabulary progressing to more extensive topic lexicon and use of precise/low frequency topic vocabulary |
| Sophistication of verb forms | Simple tensed verbs progresing to inclusion of gerunds, participles, and modals [auxiliary verbs such as *should, might*, which convey probability, obligation, etc.] |
| Sophistication of sentence structure | Simple sentences progressing to complex sentences |
| Establishment of advanced relationships between ideas | Through the use of causal, adversative, conditional, comparative, and contrastive discourse connectors |
| Coherence/cohesion | Through the use of temporal connectors and cohesive devices |
| Expansion of word groups | Through the use of derived words, nominalizations [nouns formed from verbs or adjectives, e.g., *multiplication, goodness*], adverbs, adjectives, relative clauses, prepositional phrases, and general academic vocabulary |
| Stamina | Evidence of a mental model with the use of sufficient detail and elaboration for the listener to make meaning |

The features in each explanation were coded by researchers as being at one of four points on a progression: *0 - Not evident* (i.e., not yet detectable, may use only language from the prompt, or non-English response), *1 - Emerging* (i.e., occurs infrequently/intermittently; incomplete; no repertoire of types), *2 - Developing* (i.e., occurs more often; more complete; a small repertoire of types), to *3 - Controlled* (i.e., occurs where expected; complete; broad repertoire of types; most often used accurately). See the Appendix for full descriptions of the four levels for each language feature. Inter-rater reliability was substantial (mean Cohen's kappa = .76).

**Analysis**

Each student explanation in this study was coded for mathematical procedural knowledge and the seven linguistic and discourse features described in Table 3. For the procedural knowledge teacher ratings, explanations that scored a 0 ($n$=14) were removed from analysis for the current study because these students did not produce explanations in which a strategy for finding the cubes was evident. In other words, these students did not answer the prompt. Based on the distribution of linguistic and discourse feature ratings, these ratings were collapsed into a binary variable for each feature: *Controlled* versus *Not Yet Controlled* (i.e., *Not evident*, *Emerging*, or *Developing*).

To address our research questions, we analyzed the data quantitatively using SPSS. First, we calculated descriptive statistics for teacher ratings of mathematical procedural knowledge. Then we performed chi-square analyses to investigate differences in the proportions of students rated at each level of mathematical procedural knowledge (*1*, *2*, and *3*), based on EL status, grade, mathematical strategy used, and ratings on the various linguistic and discourse features.

## Results and Conclusions

Teachers rated the majority of explanations at a *Level 2* (52%; $n$=156) in terms of their procedural knowledge, meaning that the explanations had some procedural clarity, but were missing one or two minor steps. Only 16% ($n$=48) of students demonstrated full mathematical and procedural knowledge in their explanations (*Level 3*). The remaining 32% of explanations were rated as *Level 1* ($n$=94), meaning that the explanation did not follow a clear mathematical procedure and was missing several key steps.

To answer research question 1, we conducted chi-square analyses to determine whether there were differences in the proportions of students rated at each level of mathematical procedural knowledge (*1*, *2*, and *3*), based on EL status, grade, and mathematical strategy used (i.e., counting, addition, or multiplication). There were significant differences in the proportions of EL and EO/P students that teachers rated at each level, $\chi^2$ (2, N = 298) = 11.41, p = .003, with EL students less likely to be rated at *Levels 2* and *3* than EO/P students. The proportion of students rated at each level also differed significantly by grade, $\chi^2$ (4, N = 298) = 24.45, p < .001, with Kindergarteners and 5$^{th}$ graders less likely to be rated at *Levels 2* and *3* than 3$^{rd}$ graders. In addition, students who used counting or addition were less likely to be rated by teachers at a *Level 3* than students who used multiplication (10%, 20%, and 33%, respectively; p < .001, Fisher's Exact Test).

For research question 2, we conducted chi-square analyses to determine whether teachers were more likely to rate explanations lower in terms of mathematical procedural knowledge if the students' various language features had been rated *Not Yet Controlled* by researchers. Four language features emerged as being closely linked to teachers' ratings of students' procedural knowledge: sentence sophistication, establishment of advanced relationships between ideas, vocabulary, and stamina. Explanations with *Not Yet Controlled* sentence sophistication were less likely to be rated high in terms of procedural knowledge than those with *Controlled* sentence sophistication, $\chi^2$ (2, N = 298) = 6.10, p = .047. In addition, explanations that were *Not Yet Controlled* in their establishment of advanced relationships between ideas were less likely to be rated high by teachers than those that were *Controlled,* $\chi^2$ (2, N = 298) = 10.42, p = .006. Explanations whose vocabulary sophistication was *Not Yet Controlled* were less likely to be rated by teachers at *Level 3* than explanations with *Controlled* vocabulary sophistication (15% vs. 30%, respectively; p =.043, Fisher's Exact Test). An even more striking finding indicated that explanations with *Not Yet Controlled* stamina were less likely to be rated by teachers at *Level 3* than those with *Controlled* stamina (14% vs. 48%, respectively; $p < .001$, Fisher's Exact Test). In fact, whereas 34% of explanations with *Not Yet Controlled* stamina were rated by teachers at *Level 1* in terms of students' demonstration of their mathematical procedural knowledge, no explanations with *Controlled* stamina were rated *Level 1*.

Our results indicate that certain language features may be important for teachers' interpretations of student mathematical procedural knowledge. For example, explanations that used simple sentences were less likely to be rated high by teachers than those including complex syntax structures, suggesting that it may be difficult to convey mathematical concepts without dependent clauses. Explanations rated lower by teachers were also less likely to establish advanced relationships between ideas, meaning that students used fewer discourse connectors to describe causal and conditional relationships, which are important for making mathematical claims (e.g., *I grouped the cubes together in fives, <u>because</u> I know that five times five is 25*). In addition, without a range of topic vocabulary, students had difficulty achieving the linguistic precision that is necessary for mathematical communication, and were more likely to receive lower teacher ratings. Finally, explanations that had an unclear mental model and contained few details (indications of low stamina) were far less likely to be rated high by teachers, suggesting that these discourse-level skills are especially important for students' demonstration of mathematical procedural knowledge. Teachers' ratings, however, were not related to verb sophistication, control of perspective-taking, or expansion of word groups.

**Scholarly Significance**

This study furthers our understanding of the role that language plays in conveying students' mathematical abilities, namely, in how teachers evaluate student mathematical knowledge. Previous work from the larger project focused largely on the development of language features in explanations. The addition of teacher ratings of the mathematical competence demonstrated by these explanations clarifies the relationship between language and mathematical procedural knowledge. An explanation that is not linguistically sophisticated is unlikely to be evaluated as mathematically sophisticated; therefore, if students' mathematical knowledge is being evaluated based on these explanations, they must have appropriate linguistic skills to allow for the chance of success. It is important to note, however, that our data do not establish a causal relationship between linguistic sophistication and teacher ratings of procedural knowledge.

In addition to the verbal explanations that we have analyzed for this study, students were also asked to produce written mathematical explanations on the same procedure. Future studies will examine the linguistic complexity and clarity of the participants' written explanations. By comparing linguistic features across the two domains, we will be able to provide a fuller picture of students' linguistic abilities as they relate to mathematical procedures.

This study's findings suggest that the burden of communicative competence should be divided between students and teachers in order to facilitate student academic success under new academic standards. It is imperative for educators, when conducting formative assessment, to be aware of the ways in which student language may influence the teacher's assessment of mathematical procedural knowledge. An otherwise correct mathematical explanation may lack certain linguistic features, such as sophisticated vocabulary, thereby influencing the teacher's perception of it. The implications of this study suggest that educators must ensure that students, especially EL students or children who struggle with language arts-related difficulties, are given the opportunity to develop mathematical language competence. Teachers should encourage students to provide mathematical explanations in their classrooms frequently, and ensure that their classroom environments focus on the development of both mathematical and linguistic skills.

Additionally, our findings highlight the importance of focusing instruction not only on vocabulary, but also on sentence- and discourse-level features of student explanations. During language-related content instruction, teachers often target vocabulary usage; however, our results suggest that syntactic structure, use of discourse connectors, and overall level of organization and detail in explanations also relate to teacher ratings of procedural understanding. By improving language awareness in the classroom, this study contributes to public scholarship by encouraging educators to focus on the developing features of language required to produce cogent, sophisticated mathematical explanations.

## Acknowledgements

This work was funded jointly by the WIDA Consortium at the Wisconsin Center for Educational Research and the ASSETS Enhanced Assessment Grant from the U.S. Department of Education to the DLLP project PI, Alison L. Bailey. However, the contents do not necessarily represent the policy of the U.S. Department of Education and you should not assume endorsement by the federal government. Alison Bailey also acknowledges serving as a consultant and advisory board member for WIDA projects.

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# Appendix:
# Language Feature Analysis Protocol (Abridged)

Sophistication of topic vocabulary
**0 - Not evident -** No use of topic (core or otherwise) vocabulary in English or only repeating vocabulary from prompt
**1 - Emergent -** Use of some core topic vocabulary not from prompt; No use of topic vocabulary beyond the core
**2 - Developing -** Mostly accurate use of a variety of topic vocabulary (including core topic vocab not from prompt and some precise, topic-related words beyond the core); Use of sufficient topic vocabulary (including words from prompt) to make the context clear; Possible use of imprecise/ general terms in place of technical vocabulary or deictic referents in place of topic words
**3 - Controlled -** Appropriate and accurate use of a variety of precise topic/technical vocabulary (comprised of core topic vocab not from prompt as well as several words beyond the core, including at least one technical word); Possible use of low-frequency words that enliven the explanation or evoke an image

Sophistication of verb forms
**0 - Not evident -** No verb use in English *or* simple verbs used in sentence fragments (may be used inaccurately)
**1 - Emergent -** Use of simple verb types (e.g., simple present, past, and future tense), negation, and infinitive verbs in mostly accurate usage (approx. 80%); Complex verb forms may be borrowed from prompt and repeat the phrasing exactly
**2 - Developing -** Repetitive use (i.e., relies on 1-2 complex verb types, e.g., mainly modals, past/present participles, perfect verbs, gerunds) in phrasing that is not borrowed directly from prompt; May be used accurately or inaccurately
**3 - Controlled -** Mostly correct (approx. 80%) use of several different verb types

Sophistication of sentence structure
**0 - Not evident -** One word responses; 2 or more word phrases not in English word order; Response in a language other than English; Sentence fragments placed in English word order
**1 - Emergent -** Simple or compound sentences; May or may not be accurate; No use of embedding (dependent clauses)
**2 - Developing -** Must attempt sentences with complex clause structures; May have repetitive use of one dependent structure (e.g., relative clauses, adverbial clauses, or any complementizers); May or may not be accurate; Simple and compound sentences are controlled (i.e., mostly accurate – 80% grammatically correct)
**3 - Controlled -** Non-repetitive use of a variety (i.e., at least 2 different types) of complex clause structures, including relative clauses, adverbial clauses, or any complementizers; Simple and compound sentences are controlled; Mostly accurate (80% of independent and dependent clauses are grammatically correct)

Establishment of advanced relationships between ideas
**0 - Not evident -** No discourse connectors between phrases and clauses to link advanced relationships between propositions (causal/conditional/comparative/contrastive [counterfactual], etc.); No clarity in relationships between ideas
**1 - Emergent -** Singular or repetitive use of 1 discourse connector to establish an advanced relationship; Possible use of inaccurate or illogical discourse connector within context of establishing distinct relationships between ideas
**2 - Developing -** Minimum of 2 different discourse connectors to establish an advanced relationship; Most often displays clarity in relationships between ideas
**3 - Controlled -** At least 3 different discourse connectors to establish an advanced relationship *and* a minimum of 2 different connector words for the same type of relationship (e.g. causal, conditional, etc.); Maintains clarity in relationships between ideas

Control of perspective-taking
**0 - Not evident -** Inconsistent perspective (i.e., spontaneous/random and in a way that is inappropriate in the context) such that comprehension is difficult for the listener; If prompted, does not respond with requested perspective
**1 - Emergent -** Inconsistent perspective but comprehension is not severely impaired for the listener; If prompted, may or may not respond with requested perspective

**2 - Developing -** Switches perspective once, but is then able to maintain new perspective and/or if prompted, responds with requested perspective *or* consistent use of inappropriate perspective for context; Consistent in perspective but entire explanation does not exceed three clauses (with overt subjects) (i.e., insufficient evidence of control)
**3 - Controlled -** Use of the appropriate perspective (given the prompt expectations) in a purposeful manner; Successfully manages switches in perspective if appropriate; Must contain at least four clauses

Coherence/cohesion of the explanation
**0 - Not evident –** *Coherence*: Lack of coherence in sequencing any propositions; No mental schema for explaining in a way that makes sense to the naïve listener; Steps or process being explained are largely incomprehensible to the listener. *Cohesion*: No cohesion features are present
**1 - Emergent –** *Coherence*: Some coherence by logically sequencing of propositions using a conjunction or transitional word to make the linkage; Some evidence of a mental schema but may include several incomplete thoughts/sentences; Explanations may require a lot of effort from a listener to understand the steps or process being explained. *Cohesion*: At least 1 instance of a cohesive device (may or may not be tied accurately) that ties 2 (or more) elements of the explanation together (i.e., links backward or forward)
**2 - Developing –** *Coherence*: Logical sequencing of most propositions; Repertoire includes 3 different discourse connectors (includes both conjunctions and transitional words); Evidence of a mental schema but may include 1-2 incomplete thoughts/sentences; Explanations may require some effort from a listener to understand the steps or process being explained. *Cohesion*: Some (3) instances of cohesive devices (may or may not be tied accurately)
**3 - Controlled –** *Coherence*: Logical sequencing of *all* propositions; Repertoire includes min. of 4 different discourse connectors (includes both conjunctions and transitional words); Evidence of a clear schema from which the explanation is crafted; Explanations require very little or no effort from a listener to understand the steps or process being explained. *Cohesion*: Several instances (4 or more) of cohesive devices (must be tied accurately)

Expansion of word groups
**0 - Not evident -** Explanation has only morphologically simple nouns (i.e., with no derivational complexity or modifiers) and everyday, basic verbs (with no modifiers); At the most, only repetitive use of the same one preposition; No use of general academic vocabulary
**1 - Emergent -** Some use of expanded word groups, including evidence of any of the following word groups: nominalizations, derived words, prepositional phrases (use of more than one preposition type), relative (adjectival) clauses, adjectives in noun phrases to modify nouns, adverbs to modify verbs; May or may not use general academic vocabulary or use of general academic vocabulary without other expanded word groups; May or may not be used accurately (semantically or grammatically)
**2 - Developing -** Widening repertoire of different word groups; Some general academic vocabulary terms are mixed in with everyday, casual terms; May or may not be used accurately (semantically or grammatically)
**3 - Controlled -** Wide repertoire of several different word groups; General academic vocabulary is used mostly instead of everyday, casual terms (and regardless of sample length, must include 4 different [i.e., unique] terms); Mostly used (~80%) accurately (semantically or grammatically)

Stamina
**0 - Not evident -** Response is short and incomplete in terms of expected content for the prompt (i.e., the response does not convey that the child has a mental model of the processes being explained); Few to no details (lacking info on specifics of actions, events, thoughts, ideas, such as when, where, with what/whom, how, how often, etc.); May abandon response (mid-sentence, mid-detail, mid-idea); Response may contain retracings and restarts (repetition) of the same information such that meaning-making is difficult
**1 - Emergent -** Response is short with some basic aspects of expected content; Mental model of the processes being explained is not fully discernible; May include some details; Response may contain a number of retracings and restarts such that meaning-making is disrupted in a few places
**2 - Developing -** Expanded response that conveys most but not all expected content for the specific prompt; Mental model of the processes being explained is more evident but not completely clear; Includes several expected details; Response may contain a small number of retracings and restarts but meaning-making is not disrupted
**3 - Controlled -** Sustained response giving all expected content for the specific prompt; Conveys that the child has a clear mental model of the processes being explained; Conveys actions, events, thoughts, and ideas (etc.) in detail; Response may contain a small number of retracings and restarts but is fluent and meaning-making is not disrupted.