



## A Journey into Student Thinking

### Nancy Bicknell, Student Work Study Teacher (2011)

The Student Work Study initiative promotes assessment for learning by engaging teachers in inquiry and co-learning with student work at the core. It is with great pleasure that I have started this journey with several teachers from January to June 2011. Our journey led us to explore student thinking. Specifically, our suppositions are a journey to understand the skills and strategies that may assist students working through level 2 to clarify their thinking of receptive language – when they read or listen, but also the strategies to assist students in ensuring that the ideas they express through writing are clear for others.

The first supposition, **If students assess writing with a peer using an icon, then writing includes more specific details**, explores peer assessment, metacognition and using writing strategies to ensure ideas are expressed clearly in writing.

The second supposition, **If students draw a picture and talk with a peer before solving a math problem, then students show greater understanding of the content of the math problem**, explores strategies to assist students in comprehending text in problem solving tasks. It explores strategies to clarify receptive information. It further underscores the importance of thinking skills across subject areas.

**Supposition One: If students assess writing with a peer using an icon, then written responses include more specific details.**

### *Setting the Context*

Grade Range	Number of Students Involved	Number of Classrooms Involved	Total Number of Observations	Total Time in Classrooms	Total Work Samples Collected
Gr. 2-4	10	3	50	43 hrs	53

Teachers were actively involved in the development of the suppositions, and the evolution of each based on observations and student work. Initially, I met with the teachers individually to finalize the students I would be observing and discussing. We developed a student profile of each child's strengths and learning needs, as well as suggested a critical learning need for each student. It is interesting that each teacher identified a similar critical component: to improve student writing-to expand on and provide support for ideas in writing. Writing Expectations 1.6 and 2.7 of the Ontario Language Curriculum deal with this notion of having adequate ideas and information and of making revisions to improve the clarity of the writing (Ministry of Education, 2005). It was decided that teachers would network for the next meeting in order to generate a common action plan.

Initially the idea behind the action plan was generated from a single observation of two Grade two students conversing over an exemplar. One student was specifically identified as one of the students to monitor as he/she was working through level 2 in writing. Their task was to identify the success criteria within an open response answer, to also determine which criteria was absent and to collaborate to write the missing success criteria in order to create a thorough, complete answer. Immediately, these two students were able to identify the missing success criteria (relevant text support). They conversed at length (1 - 2 minutes) to justify their point of view. They selected the most pertinent piece of text support and justified their selection orally. They then, proceeded to write down a rather vague response. At this point I asked the students if I could reread their response to them. I reread the response back to the students with the question, "Does this include all of your thinking?" The students immediately took the paper and added additional details to clarify their response. This simple question had caused the students to compare the ideas that they had both developed together orally to those within the written response. When the two did not match, the students set about revising their writing to bring the oral language ideas closer to the written response. It became clear that students needed to monitor their own understanding while reading, in order to ensure that their writing was clear for the reader, by lessening the discrepancy between thinking/talking and writing. "In other words, they read like a writer and wrote for their readers." (Ministry of Education, 2006, p.60). Specifically, we wondered whether students working through level 2 had a more difficult time thinking flexibly about different things at the same time. This supposition, in part, focuses on strategies that may assist students in developing metacognitive awareness.

## Supposition One: If students assess writing with a peer using an icon, then written responses include more specific details.

### Definitions:

**Assess:** Students examine writing with a peer to determine if success criteria is present. If it is not, students determine what to include and how to include it. For example, if it is determined that in an open response answer, the student has not answered with sufficient detail to be clear, then a peer might suggest to use the “So what” strategy to clarify the idea.

**Writing:** For the purposes of this supposition, we examined personal non-fiction writing and written response to reading.

**Icon:** The stoplights were used as a familiar icon to assist a peer reader in identifying when his/her thinking was unclear while reading a writer’s piece. If a student is able to check his/her understanding particularly around when an idea is unclear, then they would be able to assist the writer in applying a strategy (adding description, answering “so what”, providing an example) to clarify an idea. Below are two examples of icons used by students.

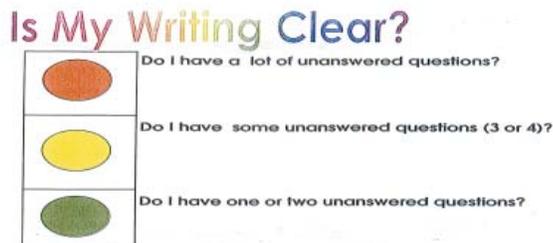


Figure 1



Figure 2

Each of these icons may provide different information to the reader. The colours represent the clarity of an idea: red-very unclear; yellow somewhat unclear; and green means the idea is clear to the reader. In Figure 1, colours are linked to guiding questions. Writer and peer write down the questions that arise in their thinking. This may help them determine exactly where the piece is unclear. In Figure 2, the colours are linked to feelings. If the student identifies the red icon, they are feeling confused about an idea in the writing and green would mean that they understand an idea. Teachers used these strategies during conferences with students prior to releasing to students for peer conferencing and independent use.

**Peers:** The intent in having students discuss writing with a peer is to encourage deep thinking through conversation around a writing task. It also reflects the complexity of monitoring understanding. It is a very challenging thing to monitor one’s understanding

while also wondering if others would understand the message or idea in the writing. When students are linked with a peer to assess for clarity of an idea, it may be an intermediate step prior to performing this skill independently.

**More specific details:** Teachers defined “sufficient specific details” as the amount of information needed to understand an idea by a reader. Is there sufficient information for a reader to understand an idea or do they have to fill in missing details (infer) within the text?

Do you think that Burger King food should be allowed at Sick Kids hospital? Why or why not? Use details from the text and your own ideas to support your thinking.

I think that burger king food shouldn't be allowed at the sick kids hospital because it unhealthy and high in salt and fat. I think this because it's not good for you. In the text it show that it's not really health

Organization	
Restate the question	<input checked="" type="checkbox"/>
Answer the question	<input checked="" type="checkbox"/>
Text Support	<input checked="" type="checkbox"/>
Schema	<input checked="" type="checkbox"/>

Am I done?	
Did I write down all of the thinking in my head?	<input checked="" type="checkbox"/>
Does my writing make sense to someone who is not in our classroom or who does not have any schema on the topic?	<input checked="" type="checkbox"/>
Did I answer "so what"?	<input type="checkbox"/>



Teacher Feedback:  
answer so what

I think that burger king food shouldn't be allowed at the sick kids hospital because it (is) unhealthy and high in salt and fat. I think this because it's (is) not good for you.\* In the text it show(s) that it is not really healthy.

This work sample is from a Grade 3 student (Amy). The written response is based on a written text about a Doctor wanting to ban the selling of Burger King food at a hospital due to the unhealthy content of the food. The reading of the text was a shared reading activity to equalize the likelihood that all students would understand the content of the reading.

It is interesting to note that the peer reader (Jon-student working through level 3) was able to identify with the writer (Amy) where the writing was not clear (\*). Jon was able to identify a strategy that the writer could apply to clarify the idea (“so what”). After a discussion, the students determined that by adding “Salt and fat in food could make sick people in a hospital sicker.” would clarify the idea. Perhaps, students working through level 2 need more sustained support/scaffolding from a peer, as was provided during this situation, to think flexibly about their own ideas in conjunction with how others would interpret the idea. This is a more concrete level of thinking than the student who could think flexibly about own thinking and clarity at the same time internally. The need for scaffolded support was more typical of the students observed as working through Level 2.

1. Explain why the Kids' Green Club is an important club to join. Use information from the text and your own ideas in your answer.

it is a important  
 CLUB BECAUSE IT HELPS  
 THE EARTH BECAUSE IT  
 IS GOOD TO HELP THE EARTH.  
 SO FOR EXAMPLE LIKE  
 PICKING UP GARBAGE  
 INSTEAD OF LEAVING  
 IT. THIS IS HOW  
 YOU CAN HELP THE  
 EARTH

It is a(n) important club because it helps the earth because it is good to help the earth. For example like picking up garbage instead of leaving \*(because if you leave it, it will destroy what is living.) This is how you can help the earth.

This student piece was written by a Grade 2 student (Carson). It is a written response to a reading of a non-continuous text (poster) that advertised joining the Kids' Green Club.

During this peer assessment (Carson and James), the students were able to identify which success criteria were present in the written response, (relevant answer to the question, a "this is" sentence, an example that supports your idea) but also they were able to identify missing criteria ("so what" statements). It was identified as a yellow light in peer understanding using the stoplight because the example (picking up garbage) did not explain how it helped the earth. The two were able to identify that this is where the "so what" should be added (\*). See above. Carson was able to orally describe what would clarify the idea after the assessment of the piece in a discussion with the Student Work Study Teacher with no prompting. Again, it seems that the support of a peer (student working through level 3) to assess the piece assisted the student working through level 2 in knowing when and where an idea was unclear. Perhaps, this activity scaffolded student thinking or made thinking more concrete. It was then, more easily reflected upon by Carson. It is interesting to note that Carson seemed to be working toward independence by being able to provide the clarifying idea independently.

## Contextual Co-Conditions---What was already going on for this to happen!

- Students had a clear understanding of the learning goal(s) (extend understanding of a text through writing) and success criteria for task. The success criteria was not strictly about the organization of the piece but also about the quality of ideas and communication (i.e., there needs to be a relevant answer to the question, there needs to be text support that relates to the answer and the student needs to explain “so what” or “so why is this important” to make the ideas clear for others)
- There were established structures for peer collaboration around tasks that promote deep (“floating in a sea of talk”) thoughtful talk
- There were established structures for descriptive feedback, time to practice, and the notion that constructive feedback is about the work not the learner (learning community)
- Students engaged in tasks that the students felt able to complete (student efficacy) by ensuring that tasks related to important notions (helping the environment, healthy eating etc.)
- The classroom environments promoted respect for learning and learners -teacher stance was more about facilitation rather than imparting knowledge (I wondered whether these conditions represented Brian Camborne’s conditions of learning.)

## Summary and Reflection

### **Supposition One: If students assess writing with a peer using an icon, then written responses include more specific details.**

At the core of this supposition is the idea that students need to monitor their own thinking in conjunction with thinking about their writing from the point of view of another. They need to determine where their ideas are vague and also must have a repertoire of strategies to make ideas clear for a reader. This truly underscores that cognitive flexibility in writing is critical. Our findings suggest that for students working through level 2 this is challenging to do at a completely independent, abstract level. This supposition ends with peer assessment because this is truly a complex task. Most of the students selected for monitoring (working through Level 2) did not reach independence in identifying where responses needed to be clarified in open response answers but still needed the point of view of the peer to assist with this. It is interesting to note however, that students' personal retellings did become detailed to the point that it was clear that they were self monitoring for clarity of ideas. These samples were not included for this report.

#### **Making our Learning Visible to Others:**

- We reflected that teaching students to monitor their own thinking and understanding are skills that need to be initiated early on in the school year and indeed may need years to be consolidated to the point of independence. In some cases this skill may always need to be associated with a peer....as perhaps it should be. Further, we reflected that students not only reach independence at different rates but also the nature and content of the writing task may impact how quickly a student is able to monitor his/her writing for clarity, independently. Students working through level 2 may need more sustained and scaffolded support for this to become independent.
- This inquiry also underscores the importance of connecting language skills across language areas – checking for understanding is a skill needed in reading, writing, when formulating oral responses and while listening to the ideas of others. We do students a disservice when we do not connect literacy skills/strategies across different subject areas. This is not the way the brain works and learns, nor is it the way our subjects should be organized. This was certainly an ...Aha moment for all of us. Connections about skills and strategies for students working through level 2 need to be explicit.

- This inquiry certainly brought clarification to the Language Curriculum expectations that focus on metacognition. We all learned about how interconnected skills and strategies are.
- This supposition repeatedly underscored the need to make skills, strategies, and criteria explicit for all students. Students need to be shown exactly what “checking for understanding” looks like (as a reader and a writer), what clear and unclear ideas looks like, and ways to make ideas clear etc. This is critically true for these students working through level 2. Also, it further underscores the importance of gradual release. The path to assist students to become independent at task (We model, we do together, we do it with peers, I do it alone) is not a linear path that we take with all students all at the same time. Some students may need to dwell in one area (peer support) longer than others. Gradual release also has nothing to do with group size (i.e. guided practice does not mean small group instruction) but all about the amount of scaffolding (a child (ren) need to further them along in their learning. Teachers can provide guided instruction to one student individually or to a whole group of students. It is the need that determines group size. Our findings substantiated the need for some students to have more sustained support before reaching independence.

### **Specific Conditions of Classroom**

It is interesting to note that one of the classrooms (Grade 2/3) involved in the inquiry was made up of all boys, by circumstance not design. This is a unique situation but perhaps points out the important notion that it is the characteristics of the learner that are most important. These students although all boys, shared similar characteristics as learners to students monitored in the other classrooms composed of both sexes. This might pose the question: Do we do a similar disservice when we characterize students as working through level 2? In order to be more precise and personalized in our instruction perhaps it is the more refined characteristics of the learner that we need to attend to (i.e. needs further support and strategies to "check for understanding").

### **Looking Forward**

As we look forward into the inquiry, we agreed that there would be value in

investigating the role of checking for understanding across oral language and reading. We, at one point, wondered whether students who showed difficulty checking for understanding while reading also had difficulty doing so for writing. It makes sense that they would. Is this also the case for listening and reading and talking and writing? We wondered whether if, in fact, there is a hierarchical nature to these skills. Would students benefit most from going back to oral language? Is this a characteristic common to a group learners (i.e. a portion of those that are working through level 2 in writing)?

The other question that arose was—how do you assist students in learning about writing strategies that apply to different writing form? Some writing strategies (using an example or providing description) are more suitable to specific forms of writing. Is there a way to assist students with developing this “conditional knowledge”? I think perhaps, that this might be a common concern of some students who are working through level 2 in writing. Some may have a more challenging time with this (i.e. knowing when to apply strategies in different forms, situations).

**Supposition Two: If students draw a picture and talk with a peer before solving a math problem, then students show greater understanding of the content of the math problem.**

### Setting the Context

Grade Range	Number of Students Involved	Number of Classrooms Involved	Total Number of Observations	Total Time in Classrooms	Total Work Samples Collected
Gr. 4, 5, 6	6	3	16	16 hrs	23

All teachers were actively involved in the development of suppositions although teachers varied in their entry point and end point. Mid-stream a same grade teacher, not initially involved in the inquiry, joined one other teacher as a small network.

### Defining the Learning Supposition

This inquiry began from observations of two students involved in problem solving activities. These students read over the problem quickly, selected the numbers from the problem but the numbers selected and the operation used did not appear to relate to the question asked. They appeared to read over the task superficially and did not read for meaning. The focus of our inquiry then, was to investigate strategies to assist

students with comprehending text to determine what a problem solving question was asking.

**Supposition Two: If students draw a picture and talk with a peer before solving a math problem, then students show greater understanding of the content of the math problem.**

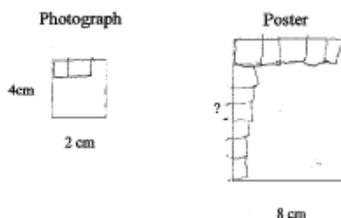
### Definitions:

**Draw a picture:** For the purposes of this supposition, drawing a picture means simply drawing what you know from the problem.

**Talk with a Peer:** During the majority of the problem solving activities undertaken for this supposition, students worked collaboratively with a peer. A structure that was co-constructed with students asked them to articulate, “What I know is.....” and “What I want to know is.....” Again, the purpose of this strategy was to have them articulate their understanding of the information provided from the Math problem.

**Show greater understanding of the content of the Math problem:** By this we mean, demonstrate reading comprehension of the math problem.

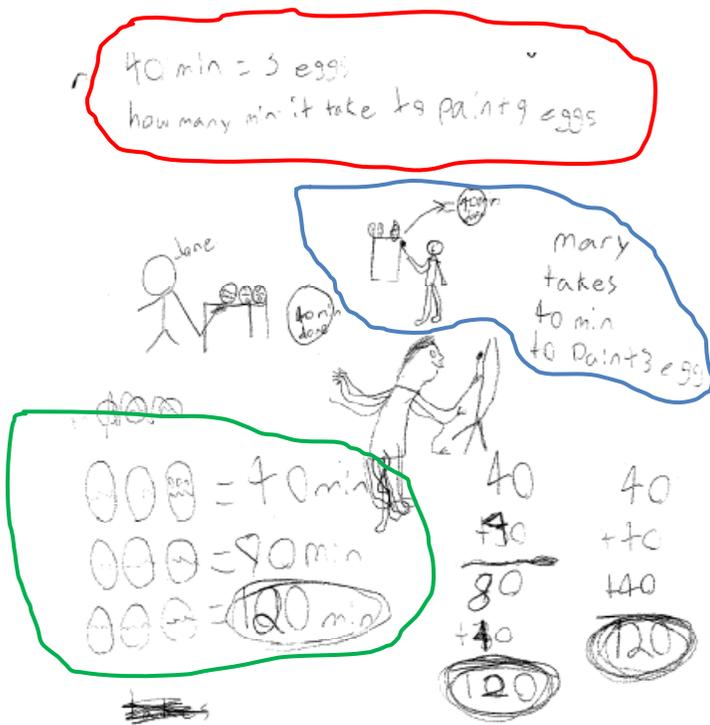
- i. The photograph below is enlarged to make a poster.  
The photograph is 2 cm wide and 4 cm high.  
The poster is 8 cm wide.  
How high is the poster?



$$4 + 4 = 8$$

The poster is 8 cm long

This student piece is from a Grade 4 student (Ty) earlier on in the inquiry process. This student's solution did not link to the important information in the problem. It is important to note that the picture for this problem was partially provided. Since the student did not need to interact with the text, we wondered whether this impacted the student understanding.



Mary is painting Easter eggs. If she can paint 3 eggs in 40 minutes, how long will it take her to paint 9 eggs? Show all of your thinking.

This Math problem was completed by two Grade 4 (Ty and Brent) students working collaboratively on a proportional reasoning question. Both students were identified as generally working through level 2 in numeracy. Brent articulated his understanding of the problem to Ty (“I know that 3 eggs take 40 minutes to cook....I need to know how long to cook 9.”). This structure had become an expected structure for problem solving. He then, recorded the information at the top of this page – circled in red. Ty and Brent co-operated to draw these pictures. Ty restated the information and represented it in the blue circled piece. Understanding is also represented in the green circled work. It is interesting to note that this may be a semi-concrete stage of understanding where Ty used both diagrams and computations. Finally, Brent represented thinking using computations in the non-circled addition sentences. It may be that students needed to represent thinking orally, by restating ideas, then visually by drawing and through key words/ideas before they achieved understanding of the text. It may be that these students have to reiterate text in multiple ways before understanding is achieved.

## Contextual Co-Conditions---What was already going on for this to happen!

- Understanding by students of the components of the problem solving framework (co-construction)
- Explicit understanding of learning goals/success criteria
- Understanding by the students of the criteria for effective collaboration with a peer (what it looks like, what it sounds like)
- Engagement in the task

### **Supposition Two: If students draw a picture and talk with a peer before solving a math problem, then students show greater understanding of the content of the math problem.**

#### Sharing Our Major Learning Points

- This supposition taught us about the impact of literacy skills in other subject areas. If students have difficulty comprehending math problems then, having them apply strategies traditionally considered literacy strategies may improve comprehension of the reading in math. The student work selected as examples were students who typically would be identified as “struggling readers”. Explicit teaching of strategies across subject areas seemed critical for these students.
- Research further suggests that this is a powerful strategy because, “the act of recasting meanings generated in one sign system (language), into another (visual art) is intended to invite reflection from a different perspective, a move that can lead to new insights. Because no code for translating language into visual images exists prior to the creation of sketches, students must invent their own. It is this act of crossing the gap between alternative symbolic systems that gives sketching its generative potential.” In other words, when you draw it, it causes one to translate one’s understanding into another form. This may assist in new learning. (Literacy Strategies for Improving Mathematics Instruction, 2005, p. 21). For the purposes of our supposition we had students translate thinking into talk and then, into pictures. This may further assist student understanding. It was particularly effective for students working through level two. Is this because creating effective mental images is too abstract and these students once again, need time to dwell in the concrete?
- The research also suggests that this is a powerful strategy because “drawing slows students down and allows them to self-correct their thoughts while their hands are sketching...” (Literacy Strategies for Improving Mathematics

Instruction, 2005, p.21). This point resonated with us since our initial observations of students noted that some students tended to rush through the process in attempting to solve the math problem.

- We also learned that collaboration and talk are powerful things! It not only allows us to scaffold our thinking on that of others but exerts a certain amount of pressure for each of the group members to work to their full potential.

## Looking Forward

My collaborative inquiry partners and I wondered if, for the portion of students that continued to have some difficulty in determining what a questions was asking, whether they needed other ways to connect with the text for understanding to be achieved (i.e. more kinaesthetically involved).

### The Same But Different – How are these two suppositions related! – My Learning

Both suppositions that we worked on represent a journey into student thinking and have served to germinate a rather simplistic working understanding of how students interact with and understand information. Eleanor Newman describes this- “as a brain at play”.

When we read or listen to information, the brain plays/interacts with the information in order to make sense of it. We visualize, infer, connect the ideas etc with those that we already have. The second supposition (**If students draw a picture and talk with a peer before solving a math problem, then students show greater understanding of the content of the math problem.**) discusses strategies students use to make sense of incoming information (reading, listening). Making these strategies explicit for students (level 2 or otherwise) is essential.

In a similar way, students use the same cognitive strategies when they generate ideas when speaking or writing. They generate ideas by visualizing, connecting with background information, comparing and contrasting. To make these ideas clear for the listener or reader, we describe using details so the audience can visualize. We give examples etc... to make ideas clear for others.

**Supposition One: If students assess writing with a peer using an icon, then written responses include more specific details.** I believe, enters into the realm of metacognitive thinking. “Metacognitive strategies are routines and procedures that allow individuals to monitor and assess their ongoing performance in accomplishing a cognitive task. “ (Dole, Nokes, Drits, 2009, p. 6) I believe in this supposition we are encouraging students to determine, “Are my ideas clear? Does it include all my

thinking? Would someone else get this?" or from the peer's perspective, "Do I understand this writing?" This is indeed a very complex task! Perhaps, more time needs to be spent in teaching metacognition. Making these skills explicit is needed for all students but is critical for some students.

**I think my fundamental learning and my final thought for my colleagues is -- we are neither teachers of literacy nor mathematics, of science nor social studies but our purpose is to become teachers of thinking!**

*References*

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A large, empty rectangular area enclosed by a dashed border, intended for student work or study.