
KNOWLEDGE BUILDING IN ACTION

PRIMARY (K-3)



Knowledge Building in Senior Kindergarten

Adapted from Christian Tarchi and Colleagues

Bringing IDEAS to life!

1.1 KNOWLEDGE BUILDING IN SENIOR KINDERGARTEN

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STARTING WITH KB PRINCIPLES

Real Ideas, Authentic Problems: “Often visiting teachers to the school will ask, ‘How do I start? What’s the beginning?’ We explain that we have the children begin with an experience that generates questions of understanding, areas of learning that they want to learn more about. The ‘theories’ of the children at the beginning of the study [are] the starting point of the Knowledge Building process. As new information is acquired (through consulting authoritative sources, experimentation, and developing a collective knowledge through the Knowledge Building discourses) new theories develop, allowing the students to refer back to their initial theories and understand how they have evolved—helping them to understand the Knowledge Building Principle that ‘all ideas are improvable.’”

Community Knowledge, Collective Responsibility: “Traditionally, students are responsible for their own learning only. In Knowledge Building students learn for their own sake but also to contribute to the knowledge of the community...New information cannot be only shared at the end of the unit such as is often done in Project-Based Learning but instead continuously so that everyone shares a breadth of understanding along with a specialized deep knowledge based on their research interest...making the individual’s learning visible to everyone else in the classroom for the benefit of all.”

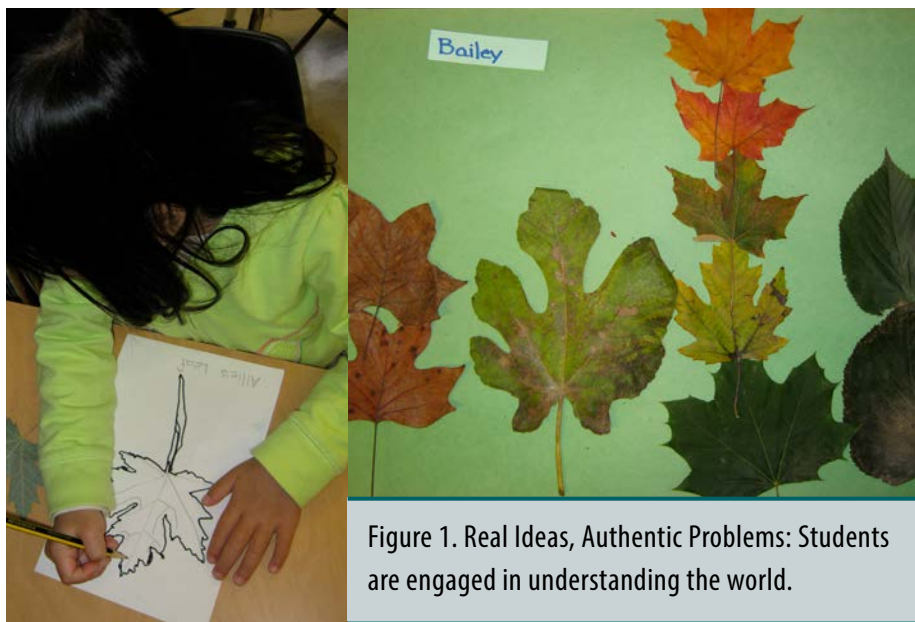
Knowledge Building Discourse: “is more than sharing knowledge; the ideas of the group actually get refined and transformed through the discourse over time. Additionally, important facets of Knowledge Building work include engaging students in designing experiments and reading books to try to find some answers to their questions.”

Constructive Use of Authoritative Sources: “Even experienced Knowledge Building teachers grapple with the appropriate time to introduce authoritative sources: too soon, and you risk hindering the flow of the children’s theories and ideas. Too late, and the children’s ideas might stagnate, or lose momentum. It is really a hard thing for teachers new to Knowledge Building to delay introducing authoritative sources. Teachers on our staff who are new to Knowledge Building might come to meetings early on in their inquiry topic and say, ‘I was thinking of introducing authoritative sources now’. I can remember one teacher asking about this, and many of the other experienced Knowledge Building teachers around table answered, ‘Just wait, just give it a few weeks, let’s see where the kids go with it.’ The new teacher did, and it worked beautifully.”

Epistemic Agency: “If we start with Epistemic Agency, we might scare teachers new to Knowledge Building. This principle is actually about what the role of the teacher is in the inquiry process. This is truly saying, ‘give children the power to design.’”

KB PROVOCATION

To start, the teacher engaged the students in a whole class discussion — what the children refer to as KB Talk (Knowledge Building Talk). The children typically sit in a circle and share their ideas while the teacher writes down each idea and engages each child. In the case reported here the question “Why do leaves fall?” became the focus for the children’s study of trees. Soon after generating ideas, the students walked to a neighbourhood park and were asked to decide which tree in the park was their favourite. Each child then photographed that tree, and collected one leaf from the tree to bring back to the classroom. The children then carefully traced their leaves and drew in the lines, or veins, as some children already knew to call them. The photographs and traced leaves were then prominently displayed where the children could make comparisons and connections based on shape, size, and colour (see Figure 1).



At the beginning of the school year during the Fall season, children viewed leaves changing colour and falling down. Leaves changing colour takes place over many weeks — a period of time that allows the children to note and observe leaves that are still on the tree beginning to change colour, then starting to fall from the tree, then the rate of falling increasing until there are no more leaves on the tree. The children may also observe the temperature changing, rainfall, or the wind

blowing stronger. Their exploration reported here took place September through December, with the work growing organically as ideas and questions arose. Typically, students were actively involved in experiments, reflections, and discussions multiple times throughout the week, but a week could pass without further exploration. The fact that phenomena of interest occurred outside each child’s home and school engaged students in exploration of natural phenomena, and things they wondered about and wished to understand — a productive context for exploring **Real Ideas, Authentic Problems** (Zhang et al., 2007).

A few days later, the teacher proposed that the children collect 10 different leaves. Back in the classroom, the children were asked to create a poster grouping their leaves in some way—for example, by kind or shape (see Figure 1). The teacher emphasized the importance of each child’s contribution because everyone in the classroom needed to benefit from his/her work. This is a possible way to address the principle of community knowledge; collective responsibility; (see Scardamalia, 2002; Zhang, Scardamalia, Reeve & Messina, 2009). By engaging students in grouping leaves by size and shape the teacher made it easy for students to share their ideas during group discussions. Indeed, the group discussions were animated and rich in content. The children discussed why leaves were falling, why they changed colour, why they got wrinkled. Each child expressed ideas; the teacher helped each

child give voice to an idea and be understood by everyone. In this way, the teacher addressed the issue of **Democratizing Knowledge** (also see So, Seah, & Toh-Heng, 2010) while students learned that every idea can be shared and developed, regardless of the speaker's personality and preferred mode of communication.

The students were also made aware of the existence of different ideas. First they would hear the idea from a peer, then re-voiced by the teacher, and accordingly be in a better position to understand that others in their community have ideas that are different from theirs. This is one of the possible ways to get started with the principle of idea diversity (see Law & Wong, 2003). By making sure that each child was heard and fully understood, the teacher had her students actively working toward reciprocity in knowledge advancement. The students get a start on the Knowledge Building Principle of **Symmetric Knowledge Advancement**, learning that to give knowledge is to get knowledge (Scardamalia, 2002). Although important, this principle can be difficult to implement in a classroom.

The children in the class, encouraged by the teacher's enthusiasm for the ideas and observations they brought to the class, added to the conversation from conversations they had at home. For example, based on conversations at home with their parents some children introduced information about oxygen and root systems and some worked with their parents to further classify the leaf they brought to class. By emphasizing and encouraging connections and differences between ideas expressed in class and at home, and at different times and places, the teacher conveyed **Pervasive Knowledge Building** (see also Nirula, Woodruff, Scardamalia, & Macdonald, 2003).

STRATEGIES FOR SUSTAINING IDEA IMPROVEMENT

In the Senior Kindergarten class, the teacher helped the students keep track of their Knowledge Building Discourse by archiving it and making it visible in the classroom (e.g., transcripts of discussions on chart paper) or by simply reminding the children orally during a discussion of what they had previously thought/shared. This led to the formation of new questions. The teacher re-read the ideas expressed by the children in their previous discussion, to help them keep track of the starting point of their ideas, and to be aware of the improvement of their theories (see Figure 2).

Teacher: "How does chlorophyll travel? We have come up with three 'maybes': maybe the chlorophyll wipes off; maybe the chlorophyll goes down the veins back to the tree; maybe the chlorophyll turns into humus and then goes back to another tree."

Through observations, experiments, reading, reflections — and discussion throughout — children come to see ideas as improvable; in some cases they were able to find answers to their questions and throughout they generated new questions. It is important to note that the ideas offered by individuals become deliberately "detached" from a particular student and "owned" by the group as a whole. The continuous reference to the ideas of the group created a psychologically safe environment for the students, where they could feel free to express their ideas without immediately being labeled "right" or "wrong," and then work on those ideas to improve their quality, coherence, and utility (Scardamalia, 2002).

Teacher: “Yes, [the leaf] is almost black. Last time we talked about two possible explanations why it had stretched. Someone suggested it grew longer because it flattened out...the other suggestion was that maybe it is growing.”

At various points in their Knowledge Building Discourse, students addressed high-level ideas and difficult concepts such as oxygen or chlorophyll. At this point, the teacher believed that their idea improvement depended on Constructive Use of Authoritative Sources. For this reason, the teacher explicitly told the children that she would read a book where they might be able to find some answers to the questions raised during the last discussion.

Teacher: “No matter how long we watch the leaf, we don’t see the chlorophyll. I found a book that could help us and give us some answers. It’s not a story, it has information in it, so it will sound a bit different.”

In introducing authoritative sources it is important to emphasize that use of the resource is not simply to answer questions but to engage students in constructive use of resources (see Zhang et al., 2007) — to understand better the present state as well as the growing edge of knowledge in the field (Scardamalia, 2002) — also feeling free to question information there and work toward refining understanding of it. Thus students were encouraged to discuss new ideas, especially ones they had raised, that were not addressed in the resource at hand.

Teacher: “Now, how should we find out what happens when the leaves die?”

Asking children to help design experiments represents an early effort to transfer high-level agency for knowledge work to students so that they are in position to assume epistemic agency (see Nirula et al., 2003). In a group discussion, the teacher reminded the children of their own questions, and the students were asked to design a way through which they could test their ideas. The teacher encouraged the children to reflect on different variables and options to be considered when designing an experiment. Leaves were placed in bowls of water, in sand, and dry leaves were put in a bin with toys to stomp over them, like feet. Predictions were made for each experiment, such as the prediction that leaves in water would grow. By designing experiments, the students were “empowered” to address their personal questions rather than having the teacher design all experiments and learning experiences (see Figure 2).

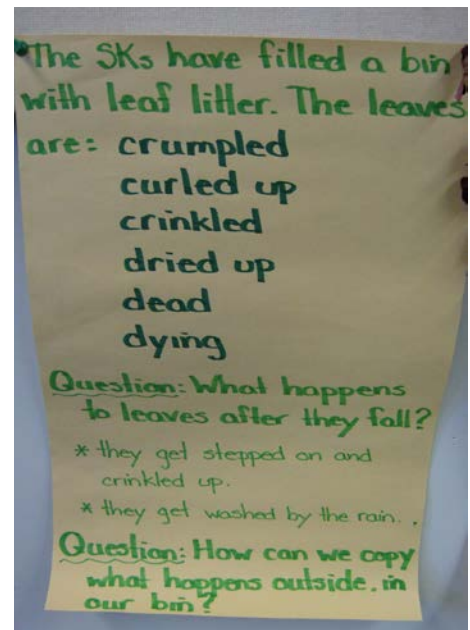


Figure 2. Improvable Ideas: Poster of children’s discussion of the improvement of their theories.

Teacher: “Someone suggested we put it back in water. Do you think it will be shorter or longer now, or maybe the same length?”

After the teacher had commented on the breadth of understanding demonstrated during a discussion, including how leaves make sugar for the tree, and how water and oxygen travel through leaves, one student asked if the class last year had learned as much. When the teacher noted that the other class had focused on roots, not leaves, the student responded: “Well, that’s what we should study next. How do roots grow?” In Knowledge Building, the class may move on to a new area of inquiry but as this example suggests, an effort is made to provide an account of the current state of understanding as well as noting more to be learned. Students are also encouraged to return to ideas from different vantage points and at different times, and link those ideas to support ever-deepening and connected knowledge advancement.

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