

## Discussion Paper

# Knowledge Building in the Wild: Four Actions to Promote Knowledge Building in the Classroom

**Authored by:** Glenn Wagner, Ph.D., Upper Grand District School Board, Guelph, Ontario, Canada  
glennwagnerphd@gmail.com

## Introduction

This discussion paper is born out of my experience and expertise as a teacher and Knowledge Builder in the secondary school system. The purpose of this paper is to ignite a discussion among seasoned Knowledge Builders surrounding one simple question: How can we encourage more educators to make Knowledge Building a regular part of their professional practice in K-12 education?

For over a decade, I have been consistently conducting Knowledge Building (KB) in my classes ranging from introductory science, health care, and physics. My PhD thesis grew from my KB work with grade 12 physics students, specifically on the social dimensions that support KB communities in creating and improving knowledge and ideas (Wagner, 2020). Subsequently, I have used my knowledge and experiences to instruct educators in KB pedagogy with the goal demonstrating how teachers might introduce KB into their own practices. My instructional method was to demonstrate practical execution of KB principles born from my KB experiences with my students. To watch them create a body of knowledge with nothing more than their curiosity and a strong sense of community is, as one of my students once remarked, “mind-blowingly awesome”. I couldn’t agree more.

Yet after several decades of KB research and implementation, it has not found widespread adoption despite its reported successes. In their paper, *Schools as Knowledge Building Organizations: Thirty Years of Design Research* (2016), Chen and Hong’s review of the literature surrounding KB research frames the purpose of their article so as “to articulate its key ideas and explore its applications in various educational contexts (p. 267)”. Specific to this discussion paper, Chen and Hong highlight educational challenges and next steps needed to overcome “formidable barriers at multiple levels of the education system (p. 281)”. Contextually, they argued that several barriers to adoption exist that may impede KB uptake in K-12 education. These barriers include institutional inertia associated with educational change, the need to cover curriculum at the expense of student autonomy required for successful KB, and the ongoing cultural dynamic where student expectations are to receive an education instead of being a socially and cognitively active participant in its creation. Pedagogically, Chen and Hong highlight the need for teachers to shift their professional strategies by transitioning from a professional processor and deliverer of knowledge to one where the teacher helps students cultivate higher order competencies that KB requires such as idea creation, monitoring progress, negotiation, and productive social engagement.

My experiences working with teachers and administrators for over the decade have mirrored these barriers. The most important challenge has been to convince practicing teachers that students are highly capable of assuming cognitive and social leadership in their learning that meets or exceeds curriculum expectations. Actions such as goal setting, planning, question-asking, assessing and evaluating knowledge, and assessment of progress are often actions associated with the professional practice of a competent teacher. However, KB not only assumes students can take on that leadership role but can thrive when doing so especially when working within a like-minded community.

## **Focus on Classroom Implementation**

Knowledge building rests on a foundation of twelve principles (Scardamalia, 2002) that guide “the production and continual improvement of ideas of value to a community” (Scardamalia, 2003). Those principles (see Appendix A) encourage students to assume a leadership stance where they take charge of those actions that are often under teacher control: goal setting, planning, question-asking, knowledge creation, idea creation, and assessment of their progress. These actions occur within a community whose shared goals create and sustain the improvement of knowledge and ideas about problems that are of interest to that community.

For teachers who are curious about KB for their classrooms, it might seem overwhelming to initiate a KB experience for their students. This may be because the twelve principles of KB invite the teacher to re-imagine what learning might become when students take control of certain actions once held under teacher control. And this can be an uncomfortable invitation for the teacher to give so much control to their students since it requires the belief and trust that students can productively engage together in meaningful discourse while learning core curriculum content as they do so. That said, work by the KB community produced a document called ‘The Knowledge Building Gallery’ showcasing how KB has been successfully introduced and used by teachers in K-12 education (find this document at [www.knowledgebuilders.net](http://www.knowledgebuilders.net) under ‘Resources’). The gallery demonstrates multiple approaches to KB implementation where teachers creatively execute KB principles for their core subject matter along with a variety of assessment practices.

What I believe is missing from this document - and KB implementation in general - is a simplified approach that brings KB principles into play using an introductory tactic that both teachers and students can understand without relying, at least initially, on the complex interactions of those principles. This tactic should not only relate with the principles but unlock them using a layer of simple language and identifiable actions during KB discourse.

## **Four Actions for Knowledge Builders**

Upon my examination of the twelve principles, there appears to be inter-related actions embedded within those principles that act as an ‘on ramp’ for teachers to help initiate KB in their professional practice. These actions – Wonder, Create, Share, Improve – are designed to express KB principles that make them more transparent in their meaning to both teacher and student. These actions are not meant to supplant those principles or to ignore their importance in order for KB discourse to flourish. On the contrary, the actions work in concert with the principles, making features of those principles visible to both student and teacher during KB discourse.

Below is a breakdown of the four actions and the principle(s) that support each action. Details of each principle can be found in Appendix A. I have drawn from those principles key words and/or actions that are either explicitly stated or implied by the wording within the principles. Since the principles can be multi-faceted in nature, some of them are used more than once to support a particular action. Where appropriate, I have included possible scaffolds that can be used within Knowledge Forum that support those actions and the principles that underlie them.

## Wonder

**Principle:** *Real Ideas, Authentic Problems*

Wondering is an ongoing, limitless action that drives initial KB inquiry. Knowledge building invites students to wonder about problems they really care about, ones that spur intrinsic motivation, motivation that is heightened when given choices in which problems they may wish to work on be they local in nature or global in scale. During the act of wondering, curiosity is in motion where ideas and questions are encouraged to better understand the nature and complexity of their problem and to imagine potential lines of inquiry.

Careful examination of curriculum goals from K-12 will often present multiple opportunities to wonder and question. In my practice, I have designed KB opportunities by acknowledging those curriculum goals that are open to inquiry through KB principles and discourse. For example, in my teaching practice topics that lend themselves naturally to wondering include grade 9 Astronomy, Grade 10 Climate Change, Grade 11 Health Care, Grade 12 modern physics. In these units of study, overall expectations and various curriculum goals encourage wondering and questioning so that learning of core content will occur from their natural curiosity about how the world might work.

The act of wondering is an invitation to explore. And when students trust one another and share their sense of wonder, they release their imaginations on problems without the constraints of factual knowledge getting in the way, at least initially. This imaginative play is where KB starts, where the creation of actionable ideas and knowledge begins to take shape.

**Scaffold Supports:** *I need to understand, I am wondering*

## Create

**Principles:** *Real Ideas, Authentic Problems; Community Knowledge and Collective Responsibility; Idea Diversity; Constructive use of authoritative sources*

At its simplest, the act of creating means demonstrating an ability to make new things. When students work with real ideas/authentic problems, they are asked to create ideas and questions then acquire knowledge in the service of those problems. Once created, an idea is often followed by questions that may lend support toward the execution of the idea. For example, we might propose an idea that income inequality is not healthy for a properly functioning society. We naturally begin to wonder from this one idea and create questions to examine it. What exactly is income inequality? Does it exist? If so, then why? And if it exists, what might we do about it? To wonder is to be curious in the service of an idea. Without creating questions, any idea - in this example, income inequality - will remain unexplored and the true nature of the ideas' utility left unrealized.

Encouraging a diversity of ideas gives a KB community multiple pathways to examine a problem. To examine each credible idea is to create the best possible path toward a solution or, at the very least, a deeper understanding of the problem. From our example above, say we come to believe income inequality to be true. Perhaps some further ideas might then be created to explore it: raise taxes on the wealthy; tax corporations at a higher rate; raise the minimum wage; give tax breaks to low-income earners; make post-secondary education free. From these diverse ideas, numerous question(s) will follow that explores the utility of each idea proposed.

To explore ideas is to work with knowledge, knowledge that is often at the limits of what is currently known by the participants in a KB community. It is here that students work with authoritative sources of

knowledge that will inform their ideas and refine their questions. During their research, students create new knowledge for themselves from those authorities whose knowledge is deemed trustworthy. One might argue whether searching authoritative sources for knowledge is indeed 'creating' knowledge since it already exists in the world. But it would be unrealistic to expect a novice to create knowledge that is truly new to the world. Instead, if knowledge is searched for - or gained by experimentation or conversation - and shared within a community, then that person has demonstrated the ability to create something new. They have made and shared a new 'thing', new knowledge that the community can examine and ultimately improve upon.

Creating ideas and knowledge from those initial wonderings is an incredible exciting process for most people, both young and old. It is a natural part of the human condition not only to create but to then share it with the world in some way. Whether through books, podcasts, videos, data, music – we dare to say, “Hey, look what I found! Look at what I made!”, and wait and see how the world reacts to these new creations.

**Scaffold Supports:** *I need to understand, New information, Picture with explanation, Video with explanation, My Idea, An idea I found, My theory, A theory I found*

## Share

**Principles:** *Epistemic Agency; Community Knowledge, Collective Responsibility; Democratizing Knowledge; Symmetric Knowledge Advancement; Embedded and Transformative Assessment*

Participants work not only to create knowledge and ideas for their own understanding but also embrace the responsibility to share it within their community. One commonality among the principles listed above is an act of sharing in some way - sharing of knowledge, ideas, goals, and assessment of progress - for those principles to be realized. Consider these brief snippets from those principles above:

*“...negotiate a fit between personal ideas and ideas of others...” (Epistemic Agency); “Contributions to shared, top-level goals”... and “Team members produce ideas of value to others and share responsibility...” (Community Knowledge and Collective Responsibility); *Expertise is distributed within and between communities.*” and “...knowledge advancement results from knowledge exchange and from the fact that to give knowledge is to get knowledge.” (Symmetric Knowledge Advancement); “The community engages in its own internal assessment...” (Embedded and Transformative Assessment). I have highlighted within those snippets the wording that gives rise to sharing, explicitly stated or implied. Without the action of sharing – both socially and cognitively - those principles remain unrealized.*

Sharing becomes self-evident during KB discourse as notes populate an online space such as Knowledge Forum. These notes often contain knowledge, ideas, questions and invitations for improvement and further exploration – all of these being acts of creation and wonder. Much like how the world beyond the classroom operates, sharing knowledge and ideas inevitably and naturally leads to their improvement.

**Scaffold Supports:** *Putting our knowledge together, Building on your idea*

## Improve

**Key Principles:** Improvable Ideas; Constructive Use of Authoritative Sources; Knowledge Building Discourse; Symmetric Knowledge Advancement; Community Knowledge, Collective Responsibility

Simply stated, the act of improving is to make something better than it was before. During KB discourse, that ‘something’ are often knowledge and ideas that are shared along with an explicit invitation to make those better somehow. For example, students may create a better idea that helps see a problem in a new light, or perhaps create new knowledge that better expands upon an idea or deepens knowledge already shared. Knowledge building discourse asks a community to not only share knowledge and ideas but to also improve upon those so that advances become self-evident and identifiable to the community. Improvement takes place when an atmosphere of psychological safety is present “...so that people feel safe in taking risks—revealing ignorance, voicing half-baked notions, giving and receiving criticism (See Improvable Ideas).” If appropriate, students may advance their discourse by exploring authoritative sources to examine and evaluate an idea or notion presented to the community.

For improvement to take place something must be created – a notion, an idea, question, or knowledge. To improve then is to integrate the act of creation into it. These two actions work in concert with the implicit understanding that the act of sharing invites improvement and creation to take place in ways that may surprise the original creator(s) of an idea or question.

**Scaffold Supports:** *Putting our knowledge together, building on your idea/knowledge, Improving your idea, challenging your idea*

## Discussion

When examined with an eye toward classroom implementation, KB principles invite actions to be taken by a community surrounding ideas and efforts to improve them. Those actions – Wonder, Create, Share, Improve – express characteristics of those principles that are identifiable and quantifiable when various scaffolds are judiciously used within Knowledge Forum.

Importantly, these actions are not methodological in nature where one action is followed by another and so on. In fact, the actions described above blend together - much like the principles themselves - to express identifiable features of those principles during KB discourse. For example, a student may spend productive time with those principles associated with creating and sharing or work with principles during the act of improving the knowledge and ideas of others.

My goal in the coming months is to initiate Wonder, Create, Share, and Improve within my classroom practice to examine its validity in greater detail across several grades and contexts. Currently, my initial application of the four actions in my professional practice has shown great promise in working with the KB principles through those actions demonstrating to both student and teacher how KB can be part of their educational growth. Students can self-assess their progress in terms of their capacity to share, their creative output, and how they have improved upon the work of others. Teachers can monitor students as a result of these four actions and provide feedback and/or next steps as a community works to achieve its goals surrounding their problem(s).

Finally, one can imagine that the four actions proposed here can provide a gateway to wider adoption of KB principles during daily classroom discourse and learning. For example, a teacher may present a novel demonstration or discrepant event and, using the language of Wonder-Create-Share-Improve, have

students create ideas on how something might work. These are then shared with a partner or small group. Within this discussion they build on each others' ideas to improve them with the goal of negotiating an idea that best describes the observation from the demonstration or event. Working in this way, KB principles become an integrated and habitual part of classroom life thereby preparing students on how the world operates beyond the classroom - one where idea improvement is, and always will be, a constant companion of the human condition.

## **Conclusion**

Knowledge building should not be limited in its' reach in K-12 education to those small sub-set of teachers, those who are unusually curious about implementing educational innovations to better their professional practice and learning for their students. Instead, to overcome barriers to implementation, we must find new methods for disseminating KB, methods that are scalable and simplified enough that most teachers can understand and execute within their own practice. The four actions outlined in this paper is an attempt at a friendlier approach, one that uses language and actions accessible to both teachers and students across K-12 education. That said, as with any idea, what I have presented here is improvable. I look forward to further discussions and comments on what I have presented here with the common, shared goal of making KB a prominent component of pedagogy moving well into the 21<sup>st</sup> century.

Contact: glennwagnerphd@gmail.com

## **References**

Chen, B., & Hong, H. Y. (2016). Schools as knowledge-building organizations: Thirty years of design research. *Educational Psychologist, 51*(2), 266-288.

Scardamalia, M. (2002). Collective cognitive responsibility for the advancement of knowledge. *Liberal education in a knowledge society, 97*, 67-98.

Scardamalia, M. (2003). Knowledge building environments: Extending the limits of the possible in education and knowledge work. In A. DiStefano, K. E. Rudestam, & R. Silverman (Eds.), *Encyclopedia of distributed learning* (pp. 269–272). Thousand Oaks, CA: Sage.

Wagner, G.R. (2020). *Socio-cognitive dynamics of knowledge building communities: A high-school physics case study*. [Doctoral dissertation, University of Toronto]. University of Toronto TSpace. <http://hdl.handle.net/1807/101132>

## **APPENDIX A: The Twelve Knowledge Building Principles**

**Epistemic Agency** – *Participants set forth their ideas and negotiate a fit between personal ideas and ideas of others, using contrasts to spark and sustain knowledge advancement rather than depending on others to chart that course for them. They deal with problems of goals, motivation, evaluation, and long-range planning that are normally left to the teachers or managers.*

**Community Knowledge and Collective Responsibility** – *Contributions to shared, top-level goals of the organization are prized and rewarded as much as individual achievements. Team members produce ideas of value to others and share responsibility for the overall advancement of knowledge in the community.*

**Symmetric Knowledge Advancement** – *Expertise is distributed within and between communities. Symmetry in knowledge advancement results from knowledge exchange and from the fact that to give knowledge is to get knowledge.*

**Embedded and Transformative Assessment** - *Assessment is part of the effort to advance knowledge—it is used to identify problems as the work proceeds and is embedded in the day-to-day workings of the organization. The community engages in its own internal assessment, which is both more fine-tuned and rigorous than external assessment and serves to ensure that the community’s work will exceed the expectations of external assessors.*

**Improvable Ideas** - *All ideas are treated as improvable. Participants work continuously to improve the quality, coherence, and utility of ideas. For such work to prosper, the culture must be one of psychological safety, so that people feel safe in taking risks—revealing ignorance, voicing half-baked notions, giving and receiving criticism.*

**Constructive Uses of Authoritative Sources** – *To know a discipline is to be in touch with the present state and growing edge of knowledge in the field. This requires respect and understanding of authoritative sources, combined with a critical stance toward them.*

**Knowledge Building Discourse** – *The discourse of knowledge building communities results in more than the sharing of knowledge; the knowledge itself is refined and transformed through the discursive practices of the community – practices that have the advancement of knowledge as their explicit goal.*

**Democratizing Knowledge** - *All participants are legitimate contributors to the shared goals of the community; all take pride in knowledge advances achieved by the group. The diversity and divisional differences represented in any organization do not lead to separations along knowledge have/have-not or innovator/non-innovator lines. All are empowered to engage in knowledge innovation.*

**Pervasive Knowledge Building** - *Knowledge building is not confined to particular occasions or subjects but pervades mental life—in and out of school.*

**Rise Above** - *Creative knowledge building entails working toward more inclusive principles and higher-level formulations of problems. It means learning to work with diversity, complexity and messiness, and out of that achieve new syntheses. By moving to higher planes of understanding knowledge builders transcend trivialities and oversimplifications and move beyond current best practices.*

**Idea Diversity** - *Idea diversity is essential to the development of knowledge advancement, just as biodiversity is essential to the success of an ecosystem. To understand an idea is to understand the ideas that surround it, including those that stand in contrast to it. Idea diversity creates a rich environment for ideas to evolve into new and more refined forms.*

**Real Ideas, Authentic Problems** - Knowledge problems arise from efforts to understand the world. Ideas produced or appropriated are as real as things touched and felt. Problems are ones that learners really care about—usually very different from textbook problems and puzzles.



