Revisiting and Revising Knowledge Building Community Design Principles: What Do the Participants Have to Say?

Etan Cohen and Yotam Hod
etancohen@gmail.com, yhod@edu.haifa.ac.il
University of Haifa

Abstract: Underlying the KBC approach is a set of idea-centered design principles. In this paper, we propose taking another look at these principles in light of qualitative empirical research focused on the experiences of KBC participants. Our study presents a phenomenographic analysis of the expressions of 21 tenth grade students who were first-time participants in a year-long KBC. Findings indicate that there is a large degree of overlap between the students' understandings of the KBC approach and the existing principles; that KBC design principles are potentially broader than we were initially aware; and that the formulation of a new principle may be in order. We conclude by outlining a promising direction for future research that stands to advance the conversation surrounding KBC design principles, based on existing formulations, participants' experiences, and in-situ observations.

KBCs: A principled-based approach

Knowledge Building Communities (KBCs) have been a central avenue of research for learning scientists since the field's inception (Scardamalia & Bereiter, 1991), and have been described as one of the longest running design experiments in education (Bereiter, 2006). Inspired by innovative businesses, academics, and other communities that regularly engage in creative knowledge work, KBCs combine theory, technology and pedagogy to redesign learning environments as knowledge building enterprises. Notwithstanding their shared characteristics, KBCs are also intended to be highly local, leaving space for teachers and learners to determine exactly *how* to go about their knowledge work. On the continuum between procedure- and principle-based pedagogical approaches, "Knowledge Building may well stand alone, far out on the principle-based end of the continuum" (Zhang, Hong, Scardamalia, Teo, & Morley, 2011, p. 266). Contrary to procedure-based approaches, which dictate to teachers and students precisely what to do, the purpose of the design principles underlying KBCs is to "serve an important regulative function for both teachers and students, helping to keep higher-level goals in mind" (Scardamalia & Bereiter, 2014, p. 403). In other words, pursuing the goals outlined in the KBC design principles—*not* the implementation of a specific set of procedures—is what sets KBCs apart from other learning environments. There are currently three comprehensive formulations of KBC design principles (Chen & Hong, 2016; Zhang et al., 2011; Scardamalia, 2002), all of which were theoretically grounded, but none of which were generated empirically. Unsurprisingly, KBC design principles have been perceived as somewhat arbitrary (1). In this paper, we propose taking another look at these "higher-level goals" with an eye on advancing the conversation around KBC design principles by revisiting and revising them in light of qualitative empirical research based on the experiences of KBC participants.

KBC design principles

The idea-centered design principles that underlie KBCs are intended to reify a Popperian theory of knowledge within real-world educational contexts. Popper distinguished between internal private mental processes and products of the mind that have been made public. According to Popper (1994), publicly accessible knowledge artifacts — problems, designs, formulae, or even works of art and music — are independent in the sense that they can be developed in ways that their originators did not intend or foresee. The notion that all ideas are malleable and improvable and that multiple people can collaboratively engage in knowledge work led to a Copernican shift in the design of learning environments. In a traditional learning environment, individual learners are meant to undergo positive changes by internalizing knowledge that is transferred to them. In contrast, the primary goal in a KBC is to change the knowledge itself, so that learners become the subjects — rather than the objects — of the learning environment, taking on the responsibility and agency that are usually reserved for the teacher. To clarify what sets KBCs apart from traditional learning environments, Scardamalia (2002, pp. 9-12) listed twelve ideas that characterize them. These later came to be known as the KBC design principles.

While there are hundreds of articles investigating KBCs, efforts to-date to articulate a complete set of KBC design principles have only been published three times (Chen & Hong, 2016; Scardamalia, 2002; Zhang et al., 2011). Recognizing the centrality of design principles to KBCs, our contention is that empirical efforts to

examine KBC design principles can advance the conversation about the theory and practice of KBCs. We therefore set out to closely analyze students' reflections summarizing their experiences after partaking in a KBC for an entire school year. Specifically, we asked (a) What existing KBC principles do students' who participate in KBCs describe? (b) In what ways do students extend the boundaries of these existing KBC principles? and (c) What new KBC design principles do students describe?

Methods

Our study presents a phenomenographic analysis of the expressions of 21 tenth grade students who were first-time participants in a year-long KBC. As part of their final assignment, we asked students to write a reflective essay describing their understanding and opinion of the KBC approach. Phenomographic analyses are second-ordered approaches focusing on the interpretations of actions and thoughts of others (Marton, 1981; Wright & Osman, 2018). This approach was useful to analyze these essays because we sought to evaluate the existing design principles by comparing them to the students' impressions. After collecting the data, we coded 344 statements in relation to existing sets of KB design principles, seeking to answer the research questions by examining what was consistent with the existing formulations, what principles required further elaboration, and what new principles emerged.

Findings

Statements that fit within existing KBC design principles

We found 132 statements that fell squarely within the existing formulations of the KBC design principles. Although the most common design principles in this category were *Epistemic Agency* (41 statements) and *Real Ideas, Authentic Problems* (29 statements), all of the original design principles came up multiple times. In some cases, students used their own words to convey the essential meaning of all three existing formulations (Chen & Hong, 2016; Scardamalia, 2002; Zhang et al., 2011). In other cases, we determined that a statement fits within the existing code, even when it only matched one of the three formulations. For instance, one of the students explained:

> We interact in two locations... students hold discussions in the physical space [about] a certain topic amongst themselves, ask questions, raise ideas, show different perspectives to refresh the topic and make it more interesting, and finally, they write everything that was said on the Forum.

Surveying the existing formulations, we noted that all of them interpret *Real Ideas, Authentic Problems* to mean that the topics learners explore are directly connected to their own lives. This is how we understood the first part of the above excerpt, which describes raising questions, ideas and perspectives to "make [the topic] more interesting". However, only one of the formulations (Scardamalia, 2002) highlights that this design principle also alludes to reification — i.e., that ideas should be treated "as real as things touched and felt". This is what the student seemed to be getting at in the second part of the excerpt, when he emphasized that everything is uploaded to Knowledge Forum.

Extending existing KBC design principles

We found a total of 79 statements that required extending the meaning of an existing design principle (Table 1). One example relates to the design principle *Collective Responsibility for Community Knowledge.* Several students pointed out that transferring responsibility from the teacher to learners means that each student will determine how involved to be. One significant aspect of this principle is that responsibility is distributed unevenly across the community. As one student noted, "the main disadvantage of this [KBC] method is that not every class and not every student wants to participate in the discussion". This means that along with being "legitimate contributors to community goals" (Zhang et al., 2011), perhaps the design principle should specify that different students may take on more or less responsibility. Similarly, in a separate example, when one of the students wrote that the KBC design "gives us the feeling that everyone is equal", we associated this notion with *Democratizing Knowledge.* However, although it is certainly in line with the KBC approach, equality does not feature in any of the existing formulations.

Belongingness to a community: A new design principle

We found 33 statements that were significant to students' understanding of the KBC approach, but did not fit into existing design principles. We accordingly formulated the new design principle, *Belongingness to a Community.*

Twenty of the 21 students who participated in the study referred explicitly to the centrality of their sense of belonging to a community to their experience in the KBC. More specifically, students felt that the social aspects of the community played an important role in motivation, participation, and the overall changes learners undergo. One of the students wrote that "we became like family", and another used the cliché "all for one and one for all". Many highlighted the close ties and friendships that were forged, as well as the feeling of being "part of something that is bigger than yourself". To demonstrate the significance of this principle, we briefly touch on two stories that students shared. Jenna, a 15-year old, explained how being part of the KBC helped her integrate into a new school:

> The students [in a KBC] grow close to one another during the year because all of the assignments require group discussions. This year I transferred to a new school and I didn't know any of the students. Thanks to philosophy class [the KBC] I was able to get closer to many of my classmates.

Contrary to Jenna's story, Heather described how feeling like an outsider and lacking a sense of belonging to the community had a direct negative impact on her contribution to the class's knowledge building efforts:

> During the experiment I saw all of my friends enjoy themselves and grow closer to one another. As opposed to them, I didn't manage. I wasn't able to understand the technology [Knowledge Forum] because I am used to the regular learning methods, and I couldn't transition between the two… By the time I started trying to integrate into the community, I was too far behind. Not in the material, but in the tools I had for learning and in my sense of belonging to the community. Therefore, my "resistance" to the experiment and sense of failure grew… My point is that in this kind of learning you need to pay extra attention to each student in the class… in an environment that is so social, if you don't pay attention to each and every student, some students might get lost.

Table 1. Extensions to existing KBC design principles.

KBC DP	Expansions of existing formulations
Real ideas and authentic problems	Unlimited knowledge growth means learners can touch on nearly any topic of interest.
Improvable ideas	Opinions and knowledge co-develop; idea-improvement may be discipline-specific; ideas emerge unpredictably and are determined by learners; idea-improvement requires deep understanding, collegiality, accepting different points of view, and being open to changing one's own view.
Epistemic agency (EA)	EA develops gradually, requires minimal instruction, emerges from social interaction, and involves getting stuck.
Collective responsibility for community knowledge	Learners are responsible to express themselves; responsibility is distributed unevenly across the community; is tied to self-confidence; and depends on cooperation motivation, and time management.
Democratizing knowledge	Shared ownership over knowledge work requires openness and acceptance of one another; all community members are equal; KBC members enjoy a large degree of independence; a democratic learning environment can be more demanding.
Idea diversity	Idea diversity requires exchanging and negotiating viewpoints, and acceptance of views that are initially opposed to one's own.
Knowledge building discourse	KB discourse is widely applicable, influencing how participants articulate their ideas and opinions across many contexts.
Rise above	[none]
Constructive use of authoritative sources	Authoritative sources can have many different meanings and interpretations.
Pervasive knowledge building	KB efforts in class impact identity and performance outside of the KBC.
Symmetric knowledge advance	Does not imply that all participants must agree with one another; contributions made by others can serve as a resource.
Concurrent embedded and transformative assessment	Does not prepare learners for standardized external tests; requires lots of individual teacher attention.

Discussion and conclusions

Analyzing students' experiences in a KBC has helped us identify three significant trends. First, there is a large degree of overlap between students' understandings of the KBC approach and existing design principles. The fact that high school students with only one years' experience in a KBC could clearly express principles that were articulated by international scholars over three decades testifies to the KBCs unique ability to bridge theory and practice. Second, the existing principles are potentially broader than contemporary KBC literature suggests. Given the key role that the principles play in implementing KBCs, we believe that it is important to formulate them in a way that encompasses their full potential by continually refining them. Finally, we found that students' experiences explicitly reflected that *Belongingness to a Community* is an important design principle. Although we recognize that this principle may have not been included in previous formulations because it is not idea-centered, our data indicate that it is vital nonetheless. Among learning scientists, it is widely accepted that learning and knowledge building are situated activities. Therefore, the KBC research community ought to consider expanding the principles to address the inextricable ties between knowledge and the makeup of the social environments in which it is created.

In the learning sciences, "design principles are often treated as objects of design themselves, with empirical studies being used to strengthen or falsify them" (Chen & Hong, 2016, p. 270). Our paper moves this conversation forward by drawing on the views of participants. We are currently engaged in a process of analyzing video and interactional data to better understand how these expanded principles, as well as the new one, were consequential in the KB process. More generally, we believe that working recursively between design principles, participants' views of their experiences, and in-situ KBC experiences of participants, is a constructive move towards refining and revising them. We believe this endeavor should be ongoing, consistent with the improvable ideas principle of KBCs.

Endnotes

(1) This point was made by Carl Bereiter in an ISLS webinar on Knowledge Building Communities, which can be found at 53:50 at the following website: https://www.isls.org/research-topics/knowledge-building-communities

References

Bereiter, C. (2006). Design research: The way forward. *Education Canada*, *46*(1), 16–19.

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

Marton, F. (1981). Phenomenography - describing conceptions of the world around us. *Instructional Science*, *10*(2), 177–200.

Popper, K. (1994). *Objective Knowledge: An Evolutionary Approach* (revised). Hong Kong: Clarendon Press.

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

Scardamalia, M., & Bereiter, C. (2014). Knowledge building and knowledge creation: Theory, pedagogy, and technology. In R. K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences, Second Edition* (pp. 397-417). New York, NY: Cambridge University Press.

Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge building: A challenge for the design of new knowledge media. *The Journal of the Learning Sciences*, 1(1), 37-68.

Wright, E., & Osman, R. (2018). What is critical for transforming higher education? The transformative potential of pedagogical framework of phenomenography and variation theory of learning for higher education. *Journal of Human Behavior in the Social Environment*, *28*(3), 257–270.

Zhang, J., Hong, H. Y., Scardamalia, M., Teo, C. L., & Morley, E. A. (2011). Sustaining knowledge building as a principle-based innovation at an elementary school. *Journal of the Learning Sciences*, 20(2), 262-307.