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Learning from the knowledge builders: Student perspectives on the challenges of classroom Knowledge Building communities

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Abstract

How do students make sense of the change process from more traditional learning environments to a Knowledge Building Community classroom (Scardamalia & Bereiter, 2006)? What challenges do they identify in their own participation and the development of the collective as a knowledge building community? This research followed a team of middle school students and teachers over the course of two years. Student interviews focused on the community's knowledge work in Knowledge Forum and their development as knowledge builders. Students identified structures that both supported and challenged student socialization into knowledge building communities. The research also examines how students' experiences can inform design researchers and teachers about enacting knowledge building classrooms.

Keywords: Change Processes, Knowledge Building, Design Problem Space, Student Socialization

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Introduction

"Change is hard" is a well-known maxim. Transitioning to classrooms that function as *knowledge building communities* (KBC) is challenging as it involves teachers and students engaging in modes of inquiry foregrounding student agency, the progressive improvement of conceptual artifacts, and collective knowledge advancement (Scardamalia, 2002; Zhang et al., 2007). This is radically different from teaching and learning in more traditional classrooms.

A growing body of research on classroom enactments of KBCs has begun to illuminate various facets of this change process. Much of the research has focused on design aspects, contributing to a better understanding of activity and participant structures (Bielaczyc, 2013; Zhang et al., 2007), technology and material tools (Oshima et al., 2012; Tao & Zhang, 2018), and humanistic approaches (Hod & Ben-Zvi, 2018). Another major area of research has focused on advancing understanding of teacher learning and professional development to support classroom enactment of the new approach (Chan, 2011; Laferrière et al., 2015). There is also a developing body of work focused on students' perspectives as participants in KBC's, including metadiscourse on their knowledge work (Resendes et al., 2015) and views on the promisingness of ideas (Chen et al., 2015), on the "journey of their thinking" (Hod et al., 2018), and on belonging within a community (Cohen & Hod, 2021).

My own work has focused on what students have to say about how they navigate their transitional experiences in becoming knowledge builders. Although several studies have begun to detail student perspectives on enculturation into KBCs, there is a need to better understand the trajectories of change that students move through. This includes: What supports students in becoming active members of a KBC? What challenges do they identify in their own participation and the development of the collective as a knowledge building community? The intent of the present paper is to build an understanding of how students navigate the shift toward becoming knowledge builders, and to consider the ways in which the students' experiences inform design researchers and teachers about enacting the KBC model in classrooms.

Research Context and Methodology

This investigation focuses on students of the Whitman Team, a team of middle school teachers that sustained their creation of KBC classrooms for over 8 years and who were recognized by KBC teachers and researchers as having developed "best practices" to learn from (Bielaczyc, 2006). Whitman Middle School is a suburban school in the Midwest United States serving approximately 600 students in grades 6th-8th (ages 10-13). The four-person team worked in 4 classrooms of roughly 25 students each. The teachers and students stayed together for both 6th and 7th grade. Each year there were three research units with the same basic structure: (a) focusing on problems within the research topic (e.g., World Religions, Astronomy), (b) sustained investigation for 8-10 weeks, and (c) working toward building an overall shared understanding. Bielaczyc (2013) provides more detail on the context and classroom practices of this KBC classroom.

My research began in the second half of the 6th grade year and ran until the end of 7th grade. I visited every 6-8 weeks to interview students and teachers, observe classes, and talk with school stakeholders. Student perspectives were investigated through interviews collected over two school years. Each interview was structured as a "tour" of the Knowledge Forum (KF) database for a given unit, engaging students in metadiscourse around their community's knowledge work and their development as knowledge builders. The interviews were exploratory in nature and questions focused on student perspectives on knowledge building and being part of a KBC, their inquiry and database entries along with those of classmates, changes over time, and online and offline practices.

It was important to hear from a variety of students. Based on their observations over the years, the teachers felt that student participation may be differentially impacted by student ability in verbal and written expression. The teachers created three categories: *High*, *Medium*, and *Low Literacy* (HL, ML, and LL), based on students' scores on the Iowa Test of Basic Skills and verbal measures. The interviews had a group distribution of 10 HL students, 11

ML students and 10 LL students. Most interviewees participated both years, resulting in a corpus of 52 interviews. This distribution provided variation within the present analysis. The analysis used a grounded approach (Charmaz, 2008). I carried out a comprehensive reading of the entire data corpus, creating data memos on places in the data where students indicated factors that had either positively- or negatively-impacted their growth as a knowledge builder or the growth of their cohort as a knowledge building community. A typology emerged across the student memos characterizing a set of influential support structures. Each interview was re-examined for evidence of each type of structure, and all corresponding quotes specific to each student and support type were documented.

Findings

The goal of the analyses was to investigate how students navigated the shift from a more traditional classroom to a KBC classroom. One of the key findings was that, across the student interviews, students consistently spoke of four key structures that they felt supported their transition:
- use of the theory-building scaffolds to deepen inquiry,
- the public visibility of student work in the KF database,
- the norm of shared responsibility for the work, and
- interactions with persons outside of the classroom context.
    Further, students identified ways in which each element had the potential to help or hinder students in becoming knowledge builders (see Table 1).

    In the four sections below I further detail students' perspectives on challenges, as I believe they can help teachers and design researchers to better understand key areas to attend to in supporting classroom change. I also propose preliminary design conjectures (Sandoval, 2014) in relation to each challenge.

Table 1. Summary of how specific design elements may both support and challenge student socialization into knowledge building communities

Element	Potential support	Potential challenge
Use of the theory-building scaffolds to deepen inquiry	• Provides guidance for progressively improving ideas • Captures traces of knowledge work over time	• Using the scaffolds requires increased time and effort • Going deep may lead to difficulty in finding informative resources • Possible routinization of the scaffolding structure • Conflicts with student preference for breadth over depth
Public visibility of student work in the KF database	• Provides models of inquiry • Fosters an appreciation of peers • Promotes attention to audience	• Provokes behaviors in service of "looking good" • Time needed for quality models to develop • Limit reading to pre-determined groups (e.g., friends)
Norm of shared responsibility for the work	• Positions each other as resources • Creates push for increased effort • Provides social-emotional supports • Relates to "real world of work"	• More time and effort to work as community • Takes time away from own inquiry • Conflicts with student preference for working alone
Interactions with persons outside of the classroom context	• Positions students as investigative researcher/expert to others, communicating that their work matters • Provides opportunities for exploring connections between their KBC work and "real world of work"	• Pushback from those who disagree with the KBC model • Discomfort with differences between their work and the work of students from other classrooms

Use of the Theory-Building Scaffolds to Deepen Inquiry

Scardamalia and Bereiter (2006) point out that understanding how knowledge is constructed is central to creative knowledge work. One

way that the KF software supports this goal is through a set of "theory-building scaffolds" ("I Need to Understand", "My Theory", "Plan", "New Learnings", "Reflection"). The Whitman students carried out their research investigations using a research Note where they repeatedly used the theory building scaffolds so that initial inquiry work drove subsequent work. Students identified this structure as a support for progressively improving their knowledge. Positive descriptions of ways in which the structure helped their knowledge building work centered on how it provided a means for guiding students in deepening their inquiry and in reflecting on their initial knowledge work and how they changed over time. Students also raised several challenges.

Across the interviews, students described various challenges in deepening their investigation through the use of the theory-building scaffolds. Several of these challenges are captured by the underscored segments in the following quote:

"*It's [deepening with theory-building scaffolds] probably overall a little harder to do completely, because <u>it takes a lot more of your time</u> and <u>a lot more thought</u> and <u>a lot more involvement</u>. And <u>you really have to be like into what you're doing to get anything out of it</u>. So overall I think it's actually a lot harder. <u>And sometimes things don't work out and it's frustrating</u>…because you want to find your answer and <u>it's just not there in any of the books or the resources, at least you can't find it</u>.*"

Students felt that working to progressively improve ideas involved more time and effort than the types of activities they were used to carrying out. Several students described how it was sometimes difficult to sustain motivation to drive their own research over a six-eight-week period. As one student pointed out, "*30 days is a long time*". Students also experienced difficulties in finding information for the questions that they raised during their inquiry. This included running up against limits in particular resources, such as the types of books available in the school library or the websites they were able to access in school.

Another challenge concerned how the structure of the theory-building scaffolds can lead to routinization of the process – following the scaffolds in a lock-step fashion. Relatedly, some students talked about how using the scaffolds helped "*you put it in a nice, or-*

derly fashion" and how their work became "*more organized … if I had it on the scaffolds*", leaning toward routinization over flexible knowledge building moves.

A further challenge concerned the focus on depth over breadth. For example:

I wrote this paper about why I think KF isn't very good… [for] my parent-teacher conference. And I wrote that I think KF has a major disadvantage because they go in depth about one thing, you're not really learning about anything else that much. I think it's good to get a brief overview of many things to get, rather than get in-depth about one thing and not know about anything else.

The student proposed that the K – 12 years might be a better time to get "*a brief overview*" of many topics, whereas the time for going in-depth is "*in college, when you find your major*". A depth-wise approach posed a challenge for students who valued breadth over depth. It also raised worries about whether it might cause them to be "*behind*" in 8ᵗʰ grade (detailed more below in discussing interactions with persons outside of the classroom context).

Discussion

In the student interviews, students noted various challenges in shifting from the kinds of short assignments that they had grown accustomed toward using the KF scaffolds to go progressively deeper into their investigations. The challenges included increased time and effort, that going deep into inquiry led to difficulty in finding resources, how the scaffolding structure might be followed in a routinized manner, and conflicts with student preferences for breadth over depth.

Student challenges indicate areas that need to be taken into consideration in working to cultivate classroom KBCs. Such areas may be thought of as *design problem spaces*. While it is beyond the scope of this paper to detail means for addressing each of the challenges emerging from the analyses, it is possible to begin to create a typology of the nature of the design problem spaces that teachers and researchers need to be aware of and explore in addressing particular challeng-

es (Kali, 2006). The student challenges identified in this section point to a need to explore three types of problem spaces: (1) normalizing challenges, (2) minimizing challenges, and (3) learner-preference challenges.

The first design problem space of *normalizing challenges* concerns the ways in which certain tensions felt by students may actually be challenges inherent to authentic knowledge work. Two of the challenges from this section open up this type of design problem space. They are how using the scaffolds required increased time and effort, and that going deep into inquiry led to difficulty in finding informative resources. Knowledge building *does* involve increased time and effort and a demand for a richer set of resources. Such student experiences, while posing a challenging transition, may also help them come to understand real aspects of constructing knowledge (Kashi & Hod, 2022). Teachers and designers can explore ways to make explicit and normalize such student experiences rather than working to eliminate them.

The second design problem space concerns challenges that should be minimized in the course of transitioning to a KBC classroom. The student challenge associated with this type is that of following the theory-building scaffolds in a routinized manner. It is not surprising to find students routinizing their use of the theory-building scaffolds, since any time a structure is introduced in a new classroom model the potential for its routinization exists. However, it is necessary for teachers and researchers to explore means for addressing and minimizing such use. Interestingly, a potential support in ameliorating routinization was suggested in the interview data. Students described flexibility in the ways they saw students using the scaffolds in the database. For example:

KF is so general that you can do certain things different ways. All the Notes on our database, I don't think even two are alike… There's still an order, but they had it in different orders. And mine is a different order too.

Breaking from a routinization of the scaffolds may be supported through making visible student examples of multiple pathways to successful knowledge building.

The third type of design problem space, *learner preference challenges*, involves working with situations where student learning preferences may not "fit" with the introduction of a new model of learning. The student challenge related to this type is the expressed preference for breadth over the depth of investigation involved in working as a classroom KBC. Addressing this issue may necessitate tailoring solutions that validate and support student preferences rather than invalidating or seeking to change such sources of resistance to the new model.

Public Visibility of Student Work in the KF Database

As the name suggests, KF provides a shared public forum where the ideas contributed by individual participants are available to the whole community (Scardamalia & Bereiter, 2006). Students described how the public nature of the community's work provided models of inquiry, fostered an appreciation of their peer's work, and promoted attention to audience. The interviews also pointed to challenges raised by public visibility of student work.

One challenge raised by students was the desire to "look good". For example, students described their discomfort in putting theories into the database unless they are "right". According to one student: *"I mean I can even 'fess up and say that I sometimes won't put in all my theories unless I'm pretty sure, certain, they're right. And I'm sure I should be putting them in, you know, even if they're wrong"*. Another student described how she even created "fake" theories by using information that she had already gained from her research to go back earlier in her note:

Well, I did this last year… I'd like research, then I'd come up here and I'd write a question that would go with what I had already researched. And sometimes, if I decided to, I'd write in on My Theory that would be right or mostly right … but theories are supposed to come before your research. So if it's a real theory it's before you know what's going on.

The visibility of peer knowledge in KF provides a means for students to see the inquiry processes of individuals and the growth of collective knowledge. Discomfort with public visibility may lead to

altering or omitting contributions to the database, resulting in false models of knowledge work.

Another challenge was that when students are just beginning to engage in knowledge building and to use KF then the number of quality models of inquiry in the database can be quite low. Several students expressed more comfort with prior approaches, such as "*As it is when you've learned before you don't think of questions, you just answer the questions that other people think up for you*". They indicated that it took time to shift to new ways of working with knowledge. In the early stages, when the work in the database gets generated by students who are all new to the KBC approach, the public visibility of the work of one's peers may not yield many helpful examples to learn from. However, students did speak of seeing improvements in the database over time, such as "*we saw our reflections from last year and see how much they've changed and, like, how much information we found and our different processes this year from last year*". They also described how it was much more interesting and helpful to read around the database in 7th grade in contrast to 6th grade.

A further challenge revealed by the interviews was whether students took advantage of the opportunity to read across the multiple entries in the database, or whether they limited their reading to a pre-determined group of students. In the interviews, several students described a tendency to read Notes from friends or specific students that they knew such as "*all the smart people*". If students are limiting their reading to a pre-determined group of peers rather than reading across the database, then they may fail to access the full range of resources available in the database. Further, they may miss the opportunity to re-shape their pre-determined notions of who someone is as a learner based on close examination of their work or through engaging in online interactions with this peer.

Discussion

Students described how participating as part of a KBC shifted their learning from more private learning activities toward making public

the inquiry processes of their classroom community in the KF database. The student challenges relating to such public visibility included feeling a need to change their entries in the KF database so that they would "*look good*", the time it took for quality work in the database to evolve, and limiting the reading of notes in the database to pre-determined groups of students. These challenges open two different types of design problem spaces than described in the previous section: (1) transitional challenges and (2) scope-expansion challenges.

The *transitional challenges* design problem space concerns implementations where students experience initial challenges in navigating the shift to a new classroom model, but these challenges then ease over time. This applies to two of the student challenges described in the present section. The first is the student challenge of feeling discomfort with making "wrong" entries in the database and the second is the challenge of how the work of one's peers in KF may not yield many helpful examples to learn from in the early stages of developing as a classroom KBC. Both challenges abated over time. For example, the discomfort that led to "faking" or omitting student contributions to the database was described by students during the 6th grade year but was not raised as an issue during the 7th grade year. As students gained familiarity and competence in working as a knowledge building community it appears they became more comfortable with publicly sharing first-draft ideas and knowledge work. Exploring means of supporting transitional challenges may engage teachers and researchers in planning for multi-phase trajectories that afford time for students to evolve as knowledge builders (see Bielaczyc, 2013 for examples of phased implementation paths for shifting KBC classrooms). It should be noted that the need for transition time for classroom communities to evolve has significant implications for short-term classroom implementations.

The second design problem space, *scope-expansion challenges*, refers to situations where students are engaged in appropriate knowledge building actions, but are doing so in too narrow a manner. Students spoke of reading and building on to their peers' contributions to the database, which are important moves for KBC participants. However, several students indicated that they were limiting the scope

of such moves to their friends or "the smart people". The nature of the knowledge building activity can be validated, while teachers explore ways to expand the scope of the moves toward more meaningful knowledge advancement.

The Norm of Shared Responsibility for the Work

Knowledge building is a collective effort involving working together to advance both individual and community knowledge. A central goal in the Whitman Team classrooms concerned students supporting each other's inquiry and sharing responsibility for the knowledge advancement of the entire class. Students described how sharing responsibility positioned each other as resources, pushed for increased effort, provided social-emotional supports, and related to the "real world of work". Students also raised several challenges.

One challenge concerned how sharing the responsibility for the work of the knowledge building community placed demands on students' time and required extra effort. For example, one student pointed out that many students "*don't like the community idea*" because they "*view it as extra work… like a burden*" and shared responsibility requires "*more than just a regular class*".

Another challenge cited by various students was feeling pulled to do one's own research while also supporting their peers. For example, one student described how the work that he was putting into his own inquiry often precluded him from reading around the database: "*you sometimes don't have time to read other people's Notes, you just, like, you have to focus on yours the most*". Not wanting to read around or not being able to read around the KF database and make build-on's to each other's ideas hinders one of the key ways that students can support each other in their work.

A few students also expressed a preference for working on their own, a stance that made it less desirable to take on a shared responsibility for the work. As one student put it, *"For me it's easier [when] I'm by myself, because I want to learn what on my terms, rather than other people's"*.

Discussion

Students noted the importance of transitioning from individual work to taking responsibility for helping to advance their community's knowledge. The challenges students experienced in making such a transition included how supporting others required more time and effort and took time away from one's own inquiry. In addition, some students expressed a preference for working alone. These three challenges indicate a need to explore design problem spaces described earlier. The first two challenges necessitate teachers and researchers work within a *normalizing challenges* design problem space. The third challenge indicates a need to explore the problem space focused on *learner preference challenges.*

Interactions with Persons Outside of the Classroom Context

In the interviews, students spoke of how many of their interactions with persons outside of the classroom context had a positive influence on their KBC work, such as interviewing persons regarding their research area. Several students also noted similarities between their own work as knowledge builders and adult knowledge workers. However, students also spoke of challenges and negative influences involving persons outside of the classroom context.

One challenge concerned persons expressing negative views that impacted students' perceptions of the KBC approach. For example, while interviewing one student at the end of 6th grade, he talked about how he planned to change teams the following year. He described how his family had heard rumors about students in the KBC classrooms, "*Well, from, no offense to KF, or the teachers or anything, but my friend's mom is a teacher at Franklin [High School] and the kids that were in KF have a horrible listening skill…And research skills*".

Another negative influence from outside perspectives on the KBC approach was expressed as a concern about not following the same curriculum as the other 6th/7th grade team at Whitman. With regard to the other team, one student worried that although "*they might not*

go as deep as we do" that they will "*get more accumulated information about many topics*". The school had two parallel 6th/7th grade teams, with roughly 100 students each. One team used a KBC approach, while the other team used a more standard curriculum and teaching methods. The concern raised by the students centered on how a focus on depth over breadth meant that they did not cover certain subject matter that would be covered by the other team, thus leaving them "behind" when students from both teams entered into 8th grade. Students also heard from their 8th grade peers that working as a KBC might lead to difficulties in 8th grade.

When the students that I interviewed were in their 8th grade year, I made a follow-up visit to the school. I met with the 8th grade teachers as a group, and teachers commented it was usually clear to them which students came from the KBC classrooms, describing how these students tended to question the things that they were told and "*those kids don't know how to do homework sheets*". The 8th grade teachers felt that a focus on solo work and report writing was necessary to prepare students for what would be expected of them in high school. Students reported that several teachers criticized the KBC classes, and publicly unfavorably compared them to the students coming in from the other team.

Discussion

Students recognized that the change to working as a KBC could lead to negative interactions with persons outside of their classroom. It is understandable that non-participating teachers and the parents of both students who are participating in an intervention and those who are not can become sensitive to the implications of a new learning model. The set of student challenges described in this section point to a different design problem space than those described earlier, that of *systemic challenges*. Exploration of this design problem space can be guided by design-based implementation research (Fishman et al., 2013) and infrastructuring considerations (Kashi et al., 2023), both of which concern identifying and supporting the needed changes within systems in implementing new learning models.

Conclusion

This paper uses student interviews from classrooms cultivating a KBC approach to give voice to and learn from student knowledge builders themselves. One key finding was that students identified four central structures that they felt supported their transitions. Student challenges within each of these four structures were also identified and discussed, helping to deepen understanding of the types of obstacles students may face in becoming a knowledge builder (Hod et al., 2018; Kashi & Hod, 2022). The analyses also led to proposing a typology of design problem spaces for teachers and researchers to explore in working to address such challenges, laying the foundation for future work investigating classroom implementations. These findings provide insight into the ways in which students' perspectives may inform design researchers and teachers about enacting the KBC model in classrooms, contributing to democratizing the KBC design process (Cohen & Hod, 2021).

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